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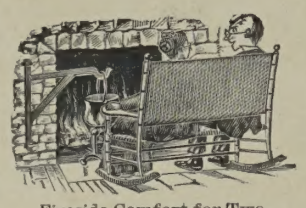
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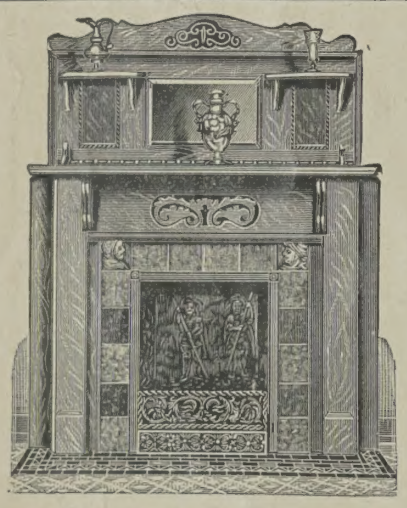
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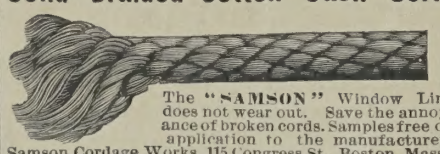
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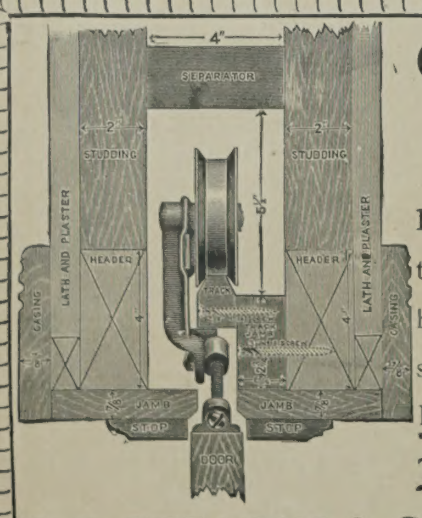
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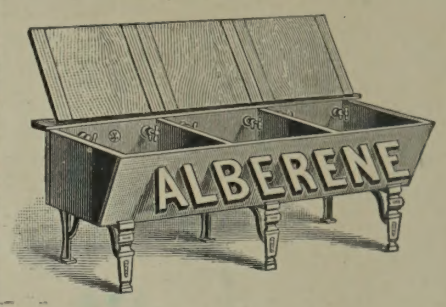
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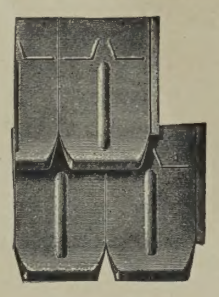
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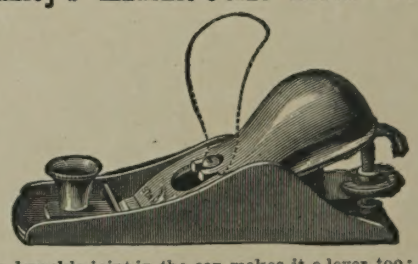
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Vol. XV.

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A RESIDENCE AT BRIDGEPORT, CONN.



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A RESIDENCE AT BRIDGEPORT, CONNECTICUT.

We present as the subject of one of our colored plates in this issue a residence, erected for Edward W. Marsh, Esq., at Bridgeport, Connecticut, from plans prepared by Mr. Joseph W. Northrop, architect, same place. The design is a striking one, and it is executed in the American renaissance style of architecture. It has many pleasing bits of detail, including a spacious piazza with Colonial columns, bay windows, tower, etc. The floor plans present a unique arrangement, all handsomely trimmed and finished in the best possible manner. The underpinning is built of rock faced bluestone, while the remainder of the building, of wood, is covered with clapboards and shingles, painted pearl gray, with trimmings of a darker shade. Roof covered with octagonal cut slates. Dimensions: Front, 49 ft. 9 in.; side, 57 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft., first story, 10 ft.; second, 9 ft.; third, 8 ft. Vestibule has a tiled floor. Hall, trimmed with cherry, contains an ornamental staircase, the posts of which extend to ceiling. Between these posts are carved brackets, forming Gothic arches. This hall and staircase are lighted effectively by windows glazed with stained glass. Parlor is trimmed with mahogany and it has a mantel of exquisite design. Library, trimmed with cherry, contains an open fireplace furnished with tiled hearth and facings with brass trimmings, and a mantel made from a special design. Dining room is trimmed with antique oak. It has a paneled wainscoting, hardwood cornice, and a buffet built in, elegantly carved and furnished with mirrors, etc. Kitchen and pantries are wainscoted and furnished with the usual fixtures replete. The second story is trimmed with white pine, finished natural. It contains four bedrooms, bath, servants' bath and study. Bathrooms are wainscoted and furnished replete. Three bedrooms on third floor. Cemented cellar contains laundry, furnace and other necessary apartments. Cost $15,000 complete.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN

A DWELLING AT SPRINGFIELD, MASS.

We illustrate this month in colors an admirably planned and picturesque residence, recently erected for Mrs. Samuel Woods, on Armory Hill, at Springfield, Mass. An additional elevation is given on page 3. On all sides of the building there are many bits of detail that are of interest, especially the bay windows and tall chimneys, which are an architectural feature in themselves. The underpinning and all stone work shown in the engraving is built of rock-faced sandstone of a reddish brown color; the remainder of the building is sheathed, papered and covered with cedar shingles, and stained a reddish brown. The western gable is carried out in the "Old English" half-timbered style, with the panels filled in with stucco work. Roof is covered with shingles and stained sienna. The building has an extreme frontage of 55 ft. 10 in. by a depth of 66 ft. 3 in. The cellar is 8 ft. in height, while the first story is 10 ft.; second, 9 ft.; third, 8 ft. 6 in. Vestibule, trimmed with quartered oak, has a large "Dutch" door, filled in with beveled plate glass. Hall is trimmed with similar wood. It has a paneled wainscoting and ceiling beams, forming deep panels. The staircase is a very handsome one, built of quartered oak. It has a massive carved newel and an octagonal projection thrown out at first landing, with windows glazed with delicate tinted glass, shedding a soft and pleasant light over upper and lower halls. The fireplace has a massive oak mantel, with hearth and facings of Anderson brick. Reception room, trimmed with cherry, is separated from hall by Colonial columns extending to ceiling, with carved capitals, etc. Drawing room is trimmed with red mahogany. It has a large bay window with seats, and a fireplace built of Tiffany brick and furnished with a mantel of excellent design. Dining room is large, well lighted and provided with a buffet carved in an exquisite manner, and a mantel of English oak extending to ceiling. This dining room has also a paneled wainscoting and ceiling beams. The floors are of oak and are highly polished. Rear hall and servants' staircase is a private one from cellar to third floor. The butler's pantry has a counter shelf of Italian marble and other shelves inclosed by glass doors. Kitchen and its apartments are wainscoted and trimmed with white wood, finished natural. There are five bedrooms, study and bathroom on second floor. Some of these apartments are trimmed with cherry, while the others are treated in delicate colors. Bathroom is wainscoted and trimmed with ash, and it is furnished in the best possible manner. There are three large bedrooms on third floor, besides ample storage. Cemented cellar contains laundry, furnace and other necessary apartments. Mr. Francis R. Allen, architect, No. 220 Devonshire street, Boston, Mass.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A COTTAGE AT BROOKLINE HILLS, MASS.

We present on page 4 a design for a cottage which has been erected for L. Shannon Davis, Esq., at Brookline Hills, Mass. The principal feature is the circular bay window and staircase. The underpinning is built of rock faced bluestone. The building above is built of wood, with the exterior shingled throughout and stained sienna with bottle green trimmings. Roof shingled. Dimensions: Front, 38 ft. 6 in.; side, 46 ft., not including front platform. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. Lobby has a tiled floor. Hall is trimmed with oak. The ornamental staircase with spindle balusters, the beaded windows and fireplace are the features in hall. The fireplace is built of brick with hearth laid with same. Parlor is trimmed with whitewood and treated in ivory white. It has a fireplace furnished with tiled facings and hearth, and a wood mantel of artistic design treated in the same color. Dining room is trimmed with oak, and it contains a fireplace with tiles and a hardwood mantel. The butler's pantry is fitted up with the usual fixtures. Kitchen and pantries are trimmed and wainscoted with whitewood finished natural. The second floor is trimmed with similar wood and it contains five bedrooms and bathroom. Bathroom is wainscoted and fitted up replete. The third floor contains one bedroom and storage. Cemented cellar contains furnace, vegetable cellar, coal bins and other necessary apartments. Cost $4,825 complete. Messrs. Sheply, Rutan & Coolidge, architects, Boston, Mass.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A DWELLING AT HOLYOKE, MASS.

We present on page 5 illustrations of a dwelling recently erected for Mr. A. E. Dickieson, at Holyoke, Mass. The underpinning is built of rock-faced bluestone, while the building above is built of wood, with the exterior framework sheathed and papered. The first story is clapboarded and painted light olive green with bottle green trimmings; second and third stories are shingled and painted light yellow. Roof shingled and painted red. Dimensions: Front, 39 ft. 6 in.; side, 47 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. Hall, trimmed with oak, contains a very handsome staircase with carved newels. This staircase is lighted by stained glass windows. Parlors are trimmed with sycamore, library with cherry, and dining room with oak. Library is provided with book cases built in on either side of fireplaces. Dining room has a parquet floor and a paneled wainscoting. Fireplaces, where shown, are furnished with tiled hearths and hardwood mantels. Kitchen and pantries are trimmed and wainscoted with white wood, finished natural, and they are fitted up complete. The second floor is trimmed with similar wood, and it contains five bedrooms and bath. Bathroom is wainscoted and furnished with the usual fixtures. There are three bedrooms and billiard room on third floor. Attic contains ample storage. Cemented cellar contains furnace, laundry and other necessary apartments. Cost $6,500, including steam heater and everything complete. Mr. G. P. B. Alderman, architect, Holyoke, Mass.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A CARRIAGE HOUSE.

We present on page 12 a very attractive and convenient stable, recently erected for J. V. Beekman, Esq., at Plainfield, New Jersey. It is built of good materials in the best workmanlike manner. The building has a brick underpinning with stone footings, and the exterior above is sheathed, shingled and stained sienna. Roof shingled. Dimensions: Front, 30 ft.; side, 25 ft. The interior throughout is ceiled with narrow beaded yellow pine, finished natural with hard oil. The first floor is concreted. Carriage room, 14 ft. 4 in. x 24 ft., contains carriage wash with drain connections, and stairs leading to second floor. Stable, 14 ft. 4 in. x 24 ft., contains two stalls, closet and harness room; the former is furnished with the usual ornamental iron fixtures and trimmings. Harness room is fitted up in a proper manner, with rack, cupboards, drawers, etc. The second floor is left unfinished. There is ample space for man's apartment if desired. Cost $1,500 complete. Messrs. Rossiter & Wright, architects, No. 47 Liberty street, New York City, N. Y.

Our engraving was made from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

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A RESIDENCE AT PLAINFIELD, NEW JERSEY.

We present on pages 6 and 7 engravings and floor plans of a residence recently erected for J. V. Beekman, Esq., at Plainfield, New Jersey. The design presents a picturesque appearance, and it shows a low, broad piazza, balcony, tower, and many bay windows. The first story and balustrade to piazza are built of brick ; second and third stories, of wood, are covered with shingles and stained sienna. Trimmings are painted white. Roof is covered with slate. Dimensions : Front, 42 ft. 3 in.; side, 51 ft. 10 in., exclusive of front piazza and rear porch. Height of ceilings : Cellar, 7 ft ; first story, 9 ft. 9 in.; second, 9 ft. 3 in.; third, 8 ft. 3 in. The plans show large, well lighted rooms, finished in a handsome manner. The cellar plan shows a coal and vegetable cellar, storage and furnace rooms. The partitions are built of brick, and the cellar floor is cemented. Vestibule and hall are trimmed with antique oak, and each has a paneled wainscoting. Hall contains a very handsome staircase, with cherry rail and balusters and oak steps. Newel post is formed of a cluster of spindle balusters. The parlor at the right of entrance is trimmed with sycamore, and the one at the left is trimmed with poplar. Library is trimmed with cherry, and the dining room with oak ; the latter has a paneled wainscoting and a buffet built in. The fireplaces, where shown, are furnished with tiled hearths and facings and hardwood mantels. Kitchen and pantries are trimmed and wainscoted with yellow pine finished natural, and they are fitted up in a first-class manner. The second floor is trimmed with white wood, and it contains five bedrooms, large closets and bath. Two of these bedrooms are stained and finished in cherry, while the remaining apartments are finished natural. Bathroom is wainscoted and furnished complete. The third floor is also trimmed with white wood, and it contains a large guest chamber, two servant bedrooms, conservatory and storage. Cost $9,175 complete. Messrs. Rossiter and Wright, architects, New York City.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT MALDEN, MASS.

We illustrate on pages 8, 9 and 10 the elegant residence of Mr. B. G. Underwood, at Malden, Mass., located corner of Hancock and Lowell streets. It is a three story frame house, with dimensions as follows : Height of floors : First story, 9 ft. 8 in.; second story, 9 ft ; third story, 9 ft.; cellar, 8 ft. The foundations are of cut stone, and the cellar is subdivided by brick walls into rooms for cold storage, workshop and laundry. The latter has set soapstone tubs, a heater for boiling clothes set in brick, and a wooden floor. The house throughout is finished in whitewood, excepting the front hall, which is in quartered oak, and the bathroom in calico ash. The parlor is finished in ivory white and gilt, the dining room imitation of oak, and the library in cherry. All the rest of the house is finished in whitewood, filled and shellacked. The house is thoroughly heated, radiators being in every room and hall, and open fireplaces are in the parlor, dining room, front hall and front chamber. In the conservatory, which opens from both the parlor and dining room, and through which passage may be had between these rooms, is an aquarium, 3 ft. by 1 ft. 6 in. by 1 ft. 6 in., fed direct from the city water main, with an outlet pipe. The conservatory will accommodate 150 pots of plants, and being between the bay windows of the parlor and dining room, and facing south, has a good location. The parlor and dining room floors have a border of hardwood, 2 ft. wide, running all around them, and all of the chambers have a border of hardwood, 6 inches wide. The library, which is on the north side of the house, is all glass on the street side, and has an inlaid hardwood floor, designed by Broughton & Terwilliger, of New York. The side entrance makes this valuable for an office, and the water closet and lavatory, which are connected, make this independent of the rest of the house. The house is lighted throughout by both gas and electricity. In the third story are a servants' room ; a storage room, in which is the tank for the hot water heater; billiard room, out of which projects a little balcony, large enough for several chairs, and from which a charming view can be had of the hills surrounding the valley of the Mystic; and a gymnasium, of extra height. The windows on first floor and front of house in second story are glazed with Pittsburgh plate glass. Screens for all doors and windows were furnished to order by E. T. Burrowes & Co., of Portland, Me. All the plumbing was furnished by Dalton & Ingersoll, of Boston, and the contractor and builder was Ivory F. Tarbox, of Malden. The first story is covered with shingles, second story clapboarded. The color is yellow with cream trimmings, and the blinds are painted dark green. Blind drains take all the water from the roof. The cellar is concreted throughout. This house complete cost about $11,000. The engravings were made from photographs taken specially for the SCIENTIFIC AMERICAN.

Frank L. Smith, architect, Boston, and Lexington, Ky. Mantels made to order by Paine Furniture Co. Fireplaces furnished by Murdoch Parlor Grate Co. Gas and electric light fixtures by R. Hollinge & Co. Stained glass windows by Redding, Baird & Co. Inlaid floors by Broughton & Terwilliger. Spence hot water heater.

A DWELLING AT HOLYOKE, MASS.

The engraving, page 11, illustrates a dwelling, erected for Mr. F. W. Ely, at Holyoke, Mass. The design presents a good substantial appearance, with a spacious piazza, balcony, bay windows, ornamental chimneys, and a plan showing a roomy interior. The underpinning and chimneys are built of local brick. The first story is clapboarded, and the second story is shingled and painted pearl gray with trimmings of a darker shade. Blinds painted bottle green. Roof shingled and painted red.



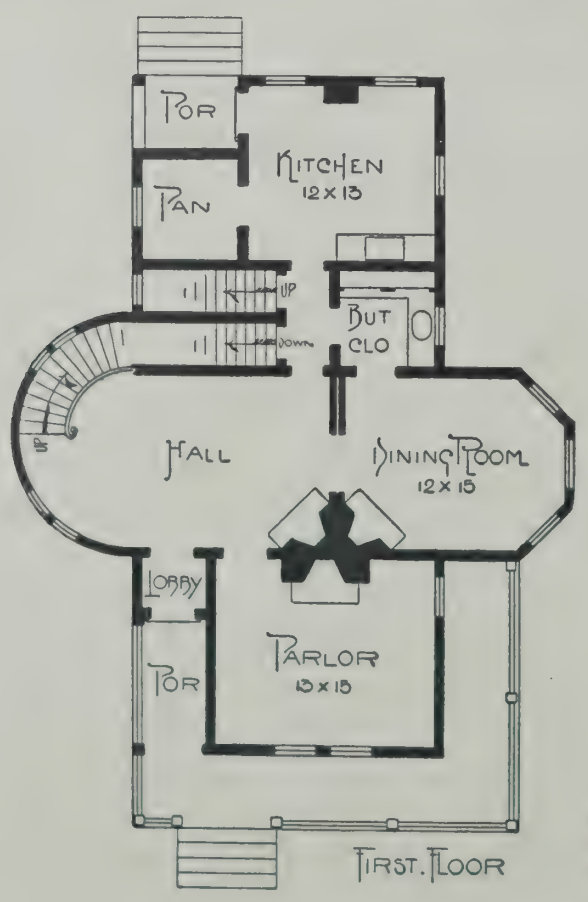
A DWELLING AT SPRINGFIELD, MASS.

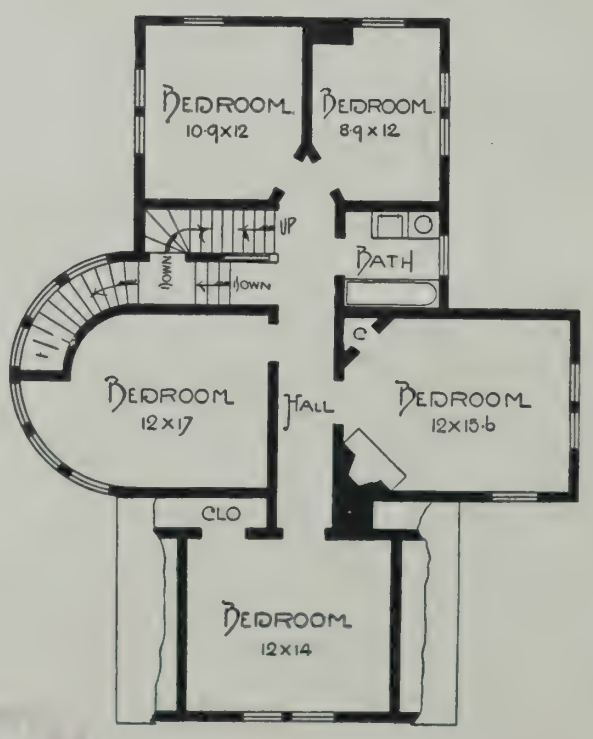
Dimensions : Front, 44 ft.; side, 71 ft., exclusive of piazza. Height of ceilings : Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. Vestibule is trimmed with quartered oak, and it has a tiled floor laid in mosaic. Hall is trimmed with similar wood, and it is furnished with a paneled wainscoting, a staircase with carved newels, and a fireplace built of brick and provided with a hardwood mantel. Reception room is treated in ivory white and gold, drawing room and library trimmed with cherry, and dining room with antique oak, the latter having a paneled wainscoting. The fireplaces are fitted up with tiled hearths and facings and hardwood mantels. Kitchen, laundry and pantries are wainscoted and trimmed with white wood, finished natural. Each apartment is fitted up with the usual fixtures in the best possible manner. The second floor contains six large bedrooms and bathroom, while the third floor contains two bedrooms and ample storage, all treated with delicate colors. Cemented cellar contains furnace and other apartments. Cost $11,825 complete. Mr. H. H. Gridley, architect, Springfield, Mass.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.



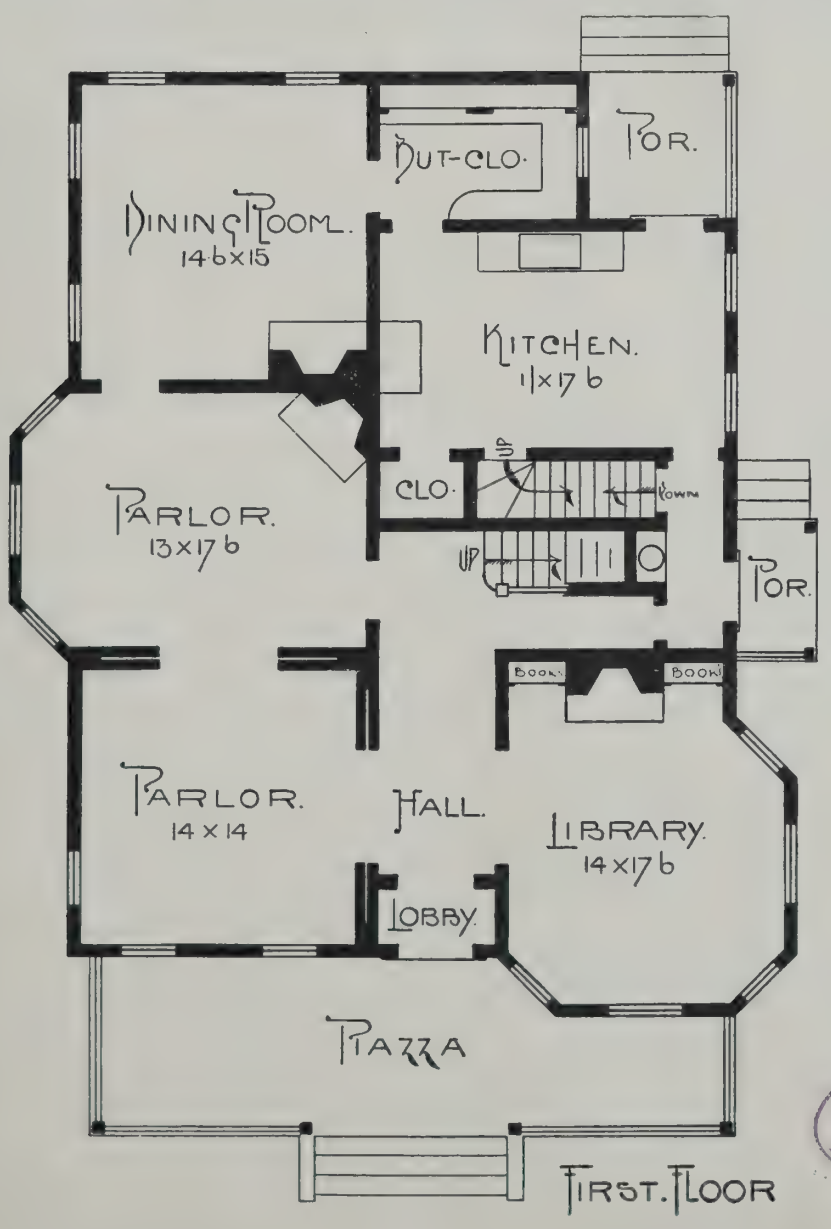


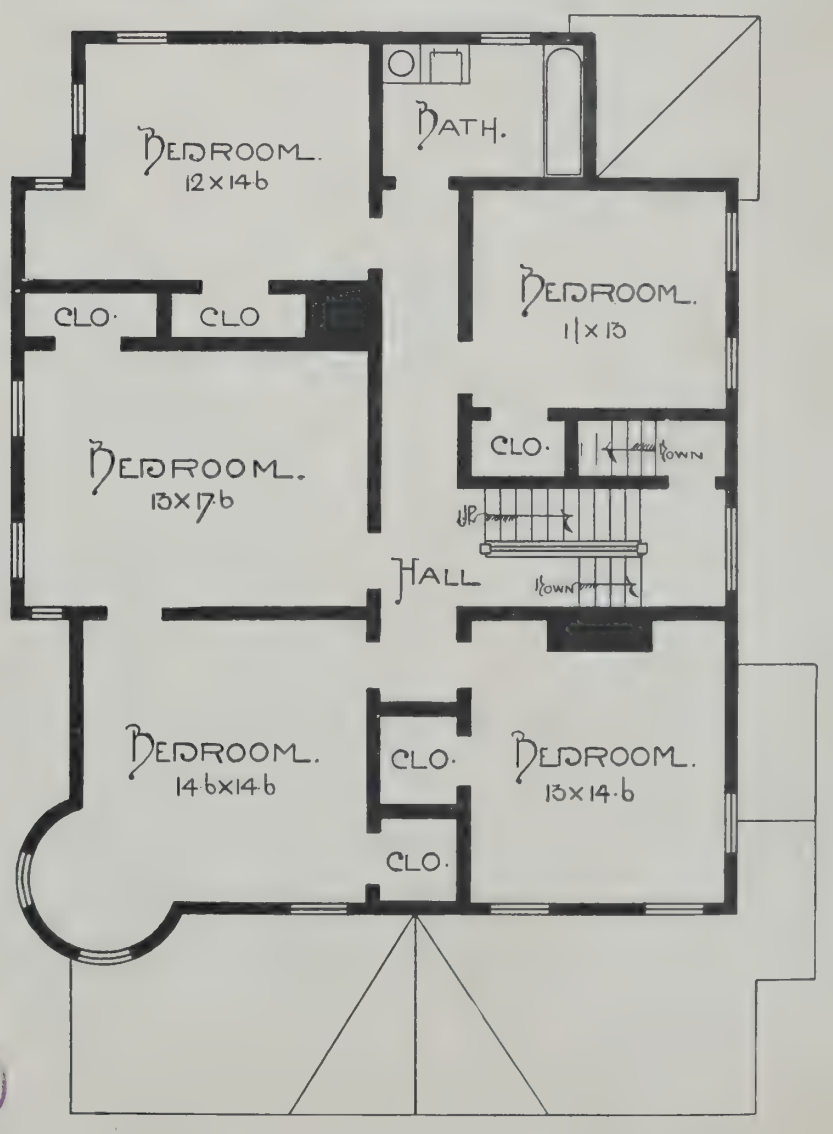




A COTTAGE AT BROOKLINE HILLS, MASS.—See Page 2.



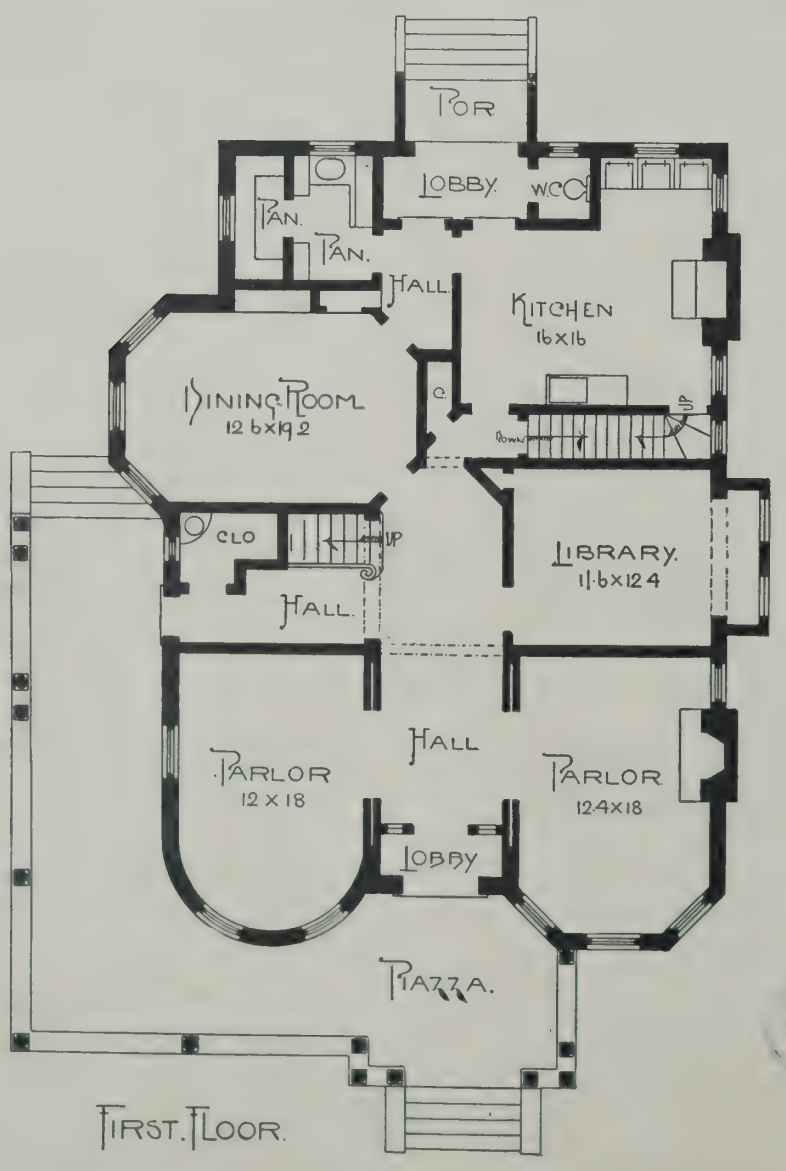




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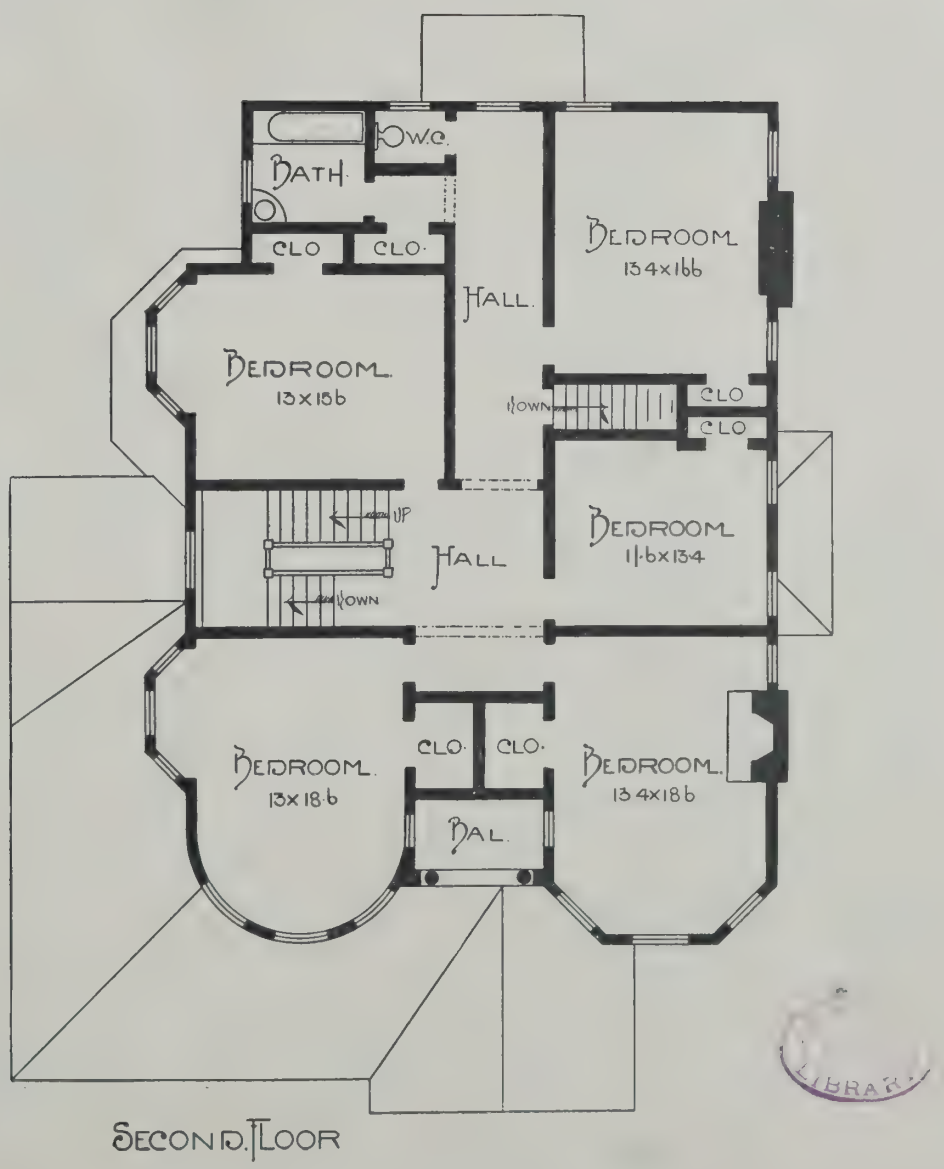
A DWELLING AT HOLYOKE, MASS.—See Page 2.





A RESIDENCE AT PLAINFIELD, N. J.—See Page 3.

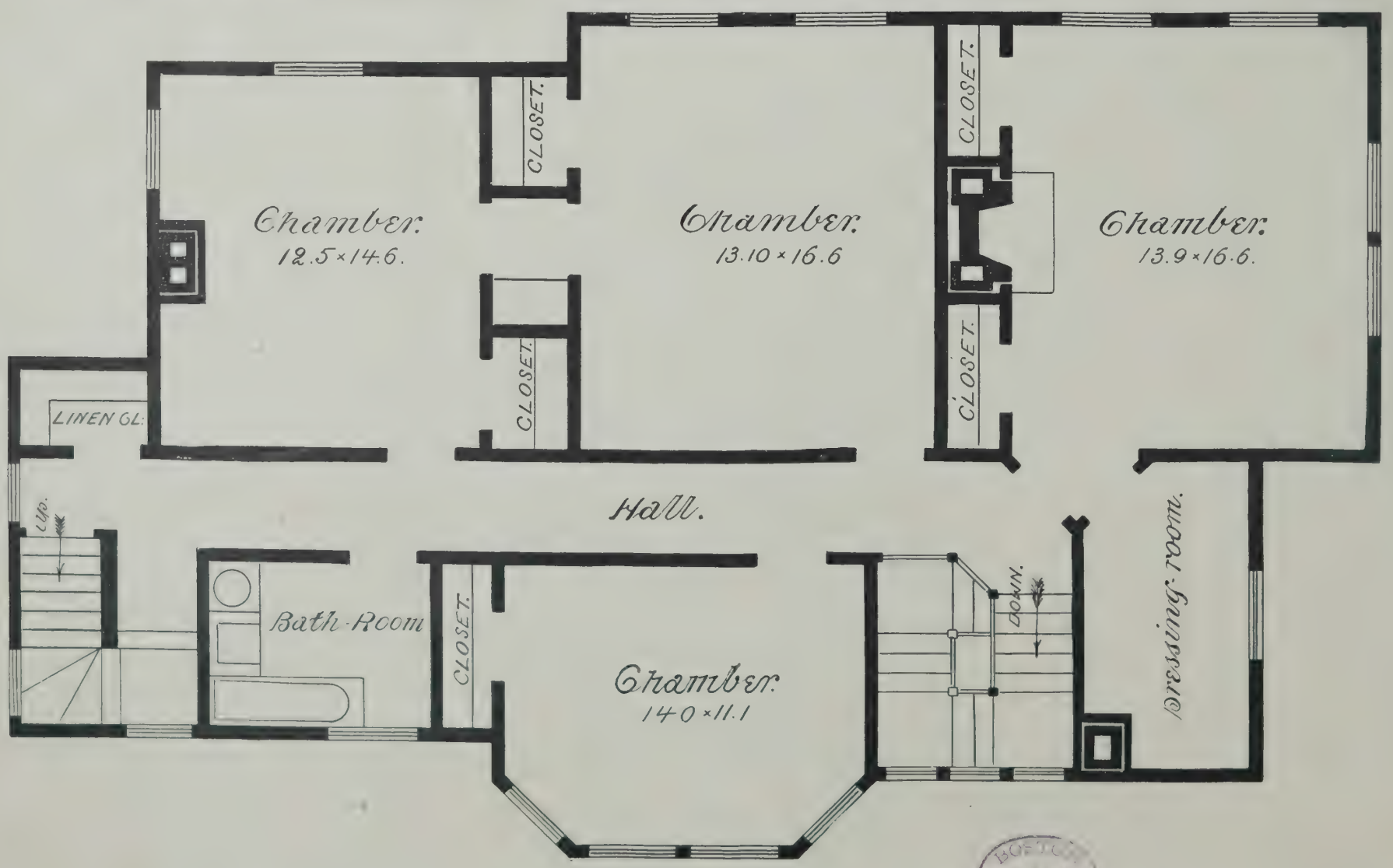




SECOND FLOOR

A RESIDENCE AT PLAINFIELD, N. J.—See Page 3.



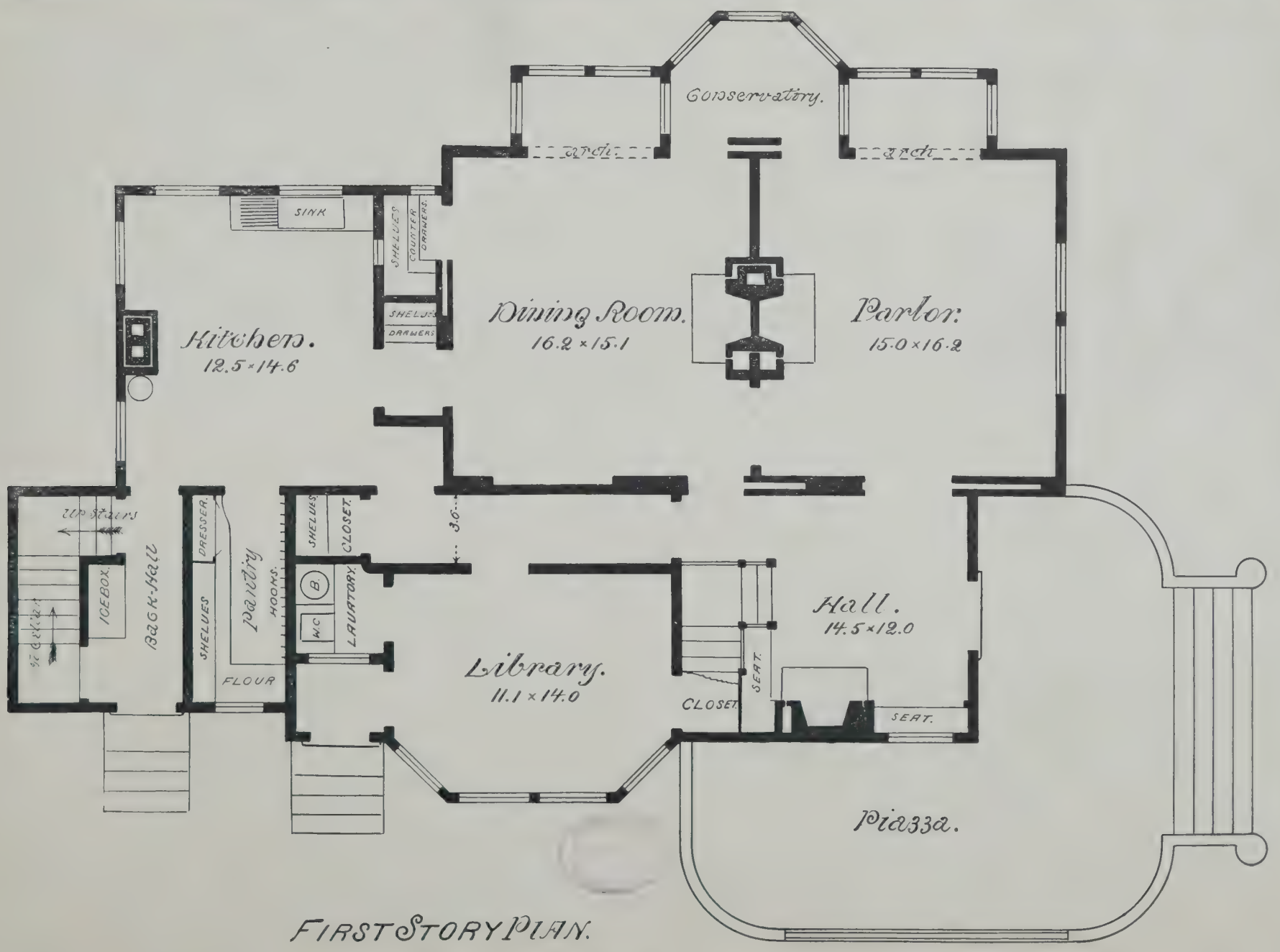


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Second Story Plan.

A RESIDENCE AT MALDEN, MASS.—See Page 3.





FIRST STORY PLAN.

A RESIDENCE AT MALDEN, MASS.—See Page 3.

House Drainage.

Mr. Geo. S. Pierson, in a paper read before the Civil Engineers' Society, gives the following practical suggestions on this home subject: "There is such a variety of branches, curves, offsets, traps, etc., now in the market, that there is no excuse for awkward, rough connections and interior projecting angles or pockets which will retain the solid portion of the sewage. The course of all pipes should be as direct as possible, and the fixtures should be grouped so as to be reached as nearly as possible by upright solid pipes and short horizontal soil or waste pipes. Horizontal pipes cannot be carried any great distance along floors or ceilings or between joists, and preserve proper inclination, for reasons which are obvious. It is customary to make waste pipes, particularly short ones, of lead, for the reason that it is much more easily manipulated than iron. The proper method of connecting the lead wastes to iron is by means of a brass thimble soldered to the lead pipe, and calked into a hub on the iron pipe.

It is a very bad practice to inclose plumbing fixtures with wooden casings, as is done in a majority of cases. It will surely tend to the accumulation of dampness and filth, and the emanation of unwholesome air. Unwholesome smells, which are attributed to some faulty construction or arrangement in the drainage pipes, often have their origin in these inclosed spaces.

It is not uncommon in summer, when the air is loaded with moisture, to see water accumulate in bead-like drops on the surface of plumbing fixtures or pipes which are kept cool by a vent of water from a trap, and course downward almost in streams. If the fixtures are not inclosed, they can be readily wiped dry. If inclosed, they receive no attention, and the accumulation of dirt and moisture becomes very offensive.

The better way is to have as little woodwork as possible surrounding these fixtures. The better kind of water-closets are made so as to require no wood surrounding them, except a cover. A very good way to fit up wash-stands is to support the slab upon brackets fastened to the wall, leaving the under side entirely open, and the pipes, traps, etc., entirely exposed, or partially hid by a narrow slab placed edgewise under the shelf proper, and extending downwards about six inches.

So far as possible, it is preferable to have soil, waste and ventilating pipes exposed, to having them inclosed with partitions where they are inaccessible either for inspection or repair. This method of arrangement is not without its influence on the plumber. He is not less inclined to pour lead joints properly, or thoroughly to calk them all around, or to make neat and perfectly wiped joints, than when he knows that the carpenter or plasterer will cover his work within a few hours. I am aware that the average house owner will look upon this arrangement as decidedly lacking in finish and not in harmony with interior decorations. Neither is a stove pipe, a furnace register, a steam radiator, or a gas fixture. This is largely a matter of education, and possibly we have been wrongly taught. It is not customary, however, to place these fixtures in rooms where any exception can be taken to this method of arrangement.

Plumbing fixtures should not be placed in sleeping rooms. They should be confined to the bathroom, where special means of ventilation can be employed, and to the kitchen, laundry and similar rooms.

A multiplicity of fixtures should be discouraged. A fixture rarely used is a greater source of danger than one used frequently.

Particular care should be used in arranging the ventilation of a building, so that the air currents tend to pass outward from the group of rooms containing plumbing fixtures, fresh air being admitted to other portions of the building. The facility with which this can be accomplished, and also the proper grouping of fixtures and simplicity of the system of pipes, will depend largely upon the architect. Ample means should be provided for flushing all portions of the soil and waste pipes and all fixtures. This is most effective when special flushing cisterns are supplied.

The ornamentation of porcelainware and of surrounding woodwork by raised or carved patterns is positively detrimental. A perfectly plain, smooth, impervious surface is more conductive to cleanliness. A very usual fault in house plumbing is too many fixtures, too much pipe too much ornamentation. The owner must have perused the sanitary journals, or have heard some sanitary engineer talk sewer gas until he is thoroughly imbued with the idea that there is something which must be done thoroughly, and he not unnaturally comes to think that the more extensive the plant, the more sewer gas will be annihilated.

Roofs and Roof Coverings.

In actual execution the roof, of course, precedes the roof covering; but in working out a design it is frequently the covering which decides the shape of the roof. When once settled, it fixes at least the lower limit for the pitch, and it may even have an influence on the question of hips or gables. In olden times this influence was marked. In many districts hip-tiles were scarcely to be had; lead hips were too costly for common use, and hips made up with slates and mortar were both unsightly and insecure. This difficulty has long since vanished. Facilities for transit are, from one point of view, even too great. Materials can be so readily taken from place to place, that local peculiarities in building are tending to die out. The country, and one might almost say the world, is getting too much alike all over it, and, amongst other things, we now find tile-hips and ridges everywhere. They have, however, usefulness at least to recommend them. They supply a practical want; but this is more than can be said of all the materials which are nowadays becoming fashionable in localities to which they do not belong. Traveling has become easy; but when all places become pretty much alike, what will there be to travel for? It is time that all architects set themselves, as some have long done, to fight against this impending uniformity, and it is worth noting how many roofing materials, and how many ways of using those materials, may still be found within the boundaries of England alone.

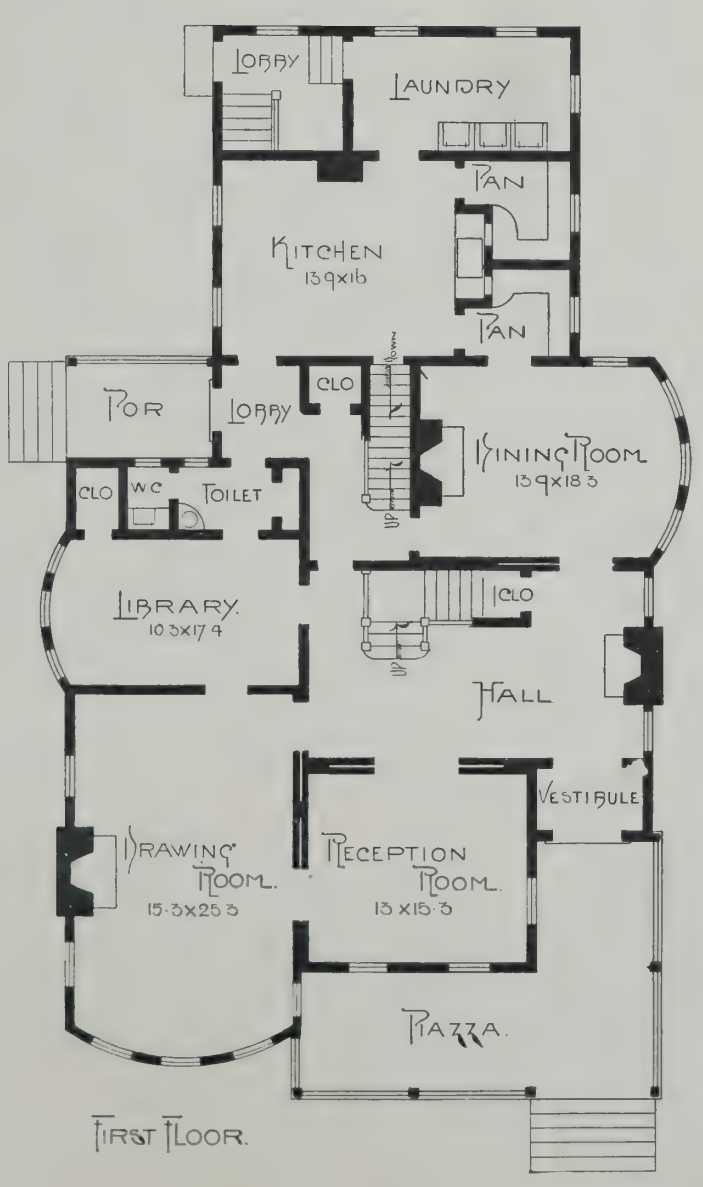


HOLLAND STAIRWAY.—A RESIDENCE AT MALDEN, MASS.

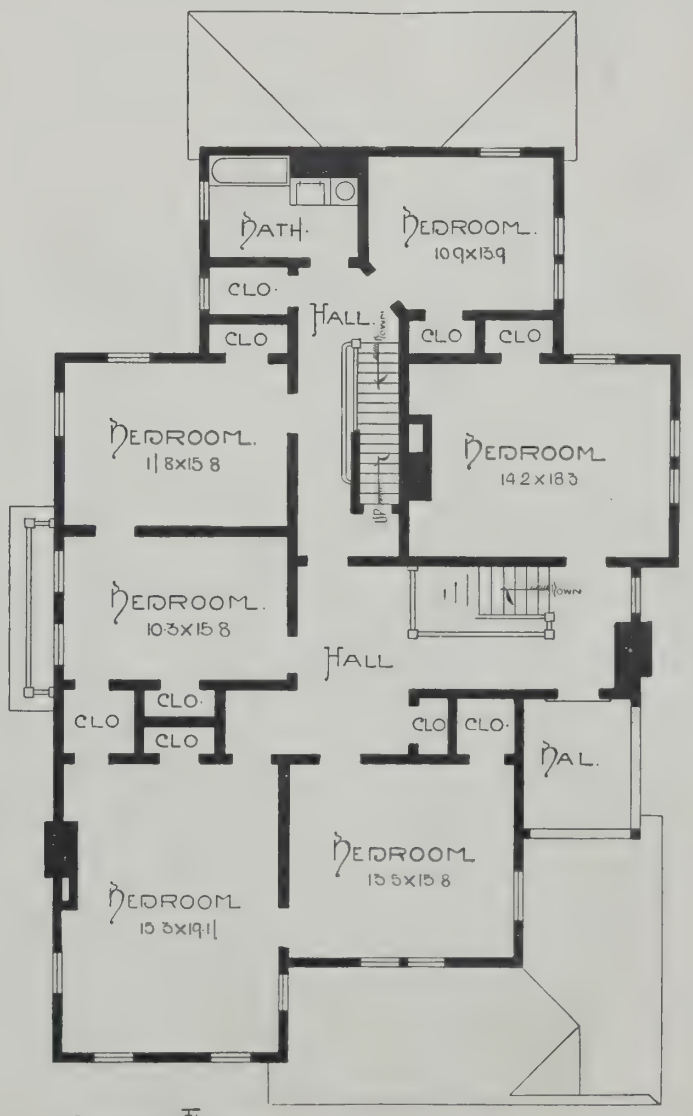
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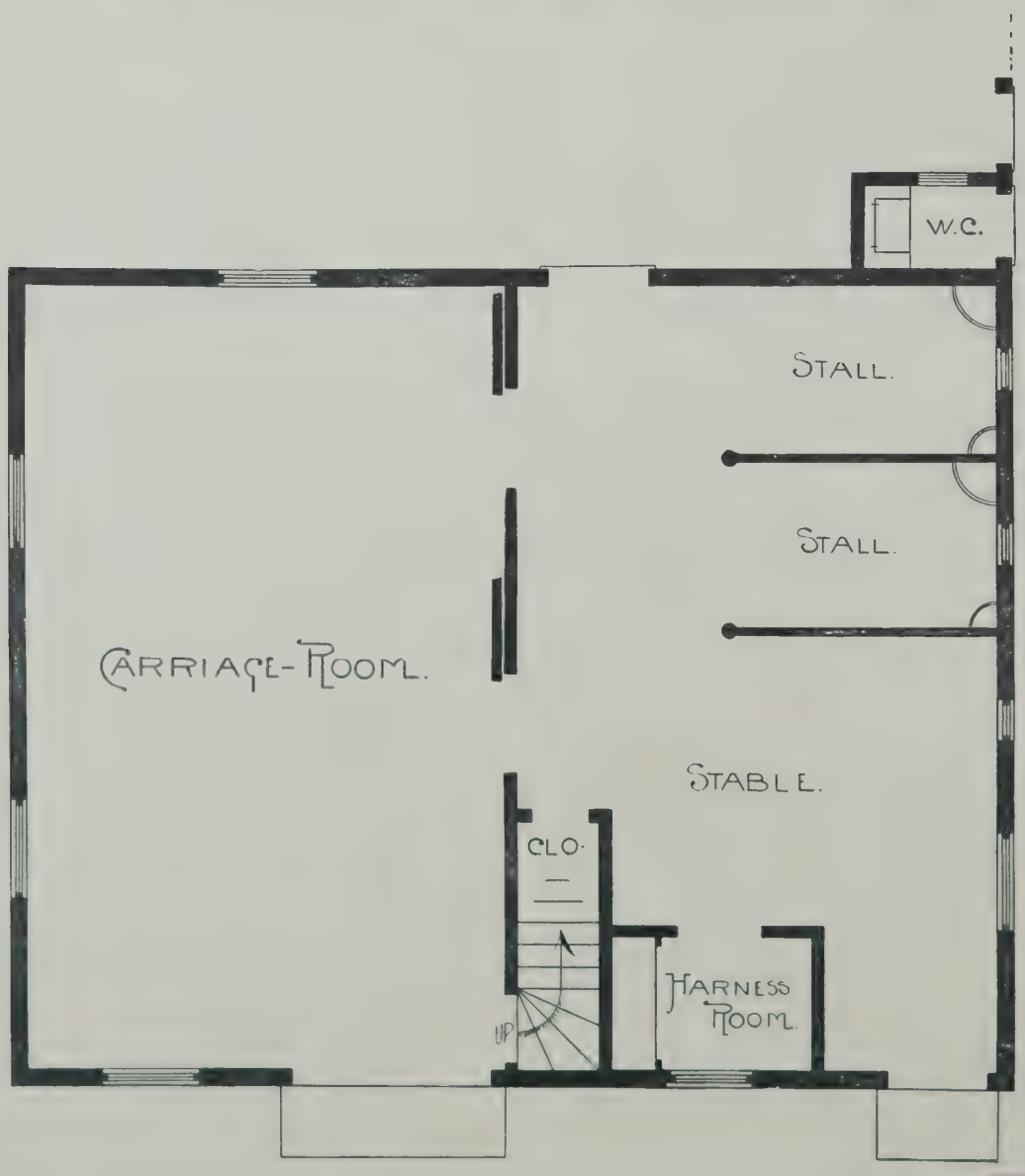
FIRST FLOOR.



SECOND FLOOR

A DWELLING AT HOLYOKE, MASS.—See Page 3.





GROUND PLAN

A CARRIAGE HOUSE.—See Page 2.

Wall Papers.

If a paneled effect is desired for a room that is intended to be particularly dainty, such as a boudoir, nothing would be prettier than to use a plain paper at the top and bottom of the wall, and to separate the panels. This should be delicate in tone, buff, cream or pale blue, and used in strips from fifteen to eighteen inches wide. The panels themselves should be large, not less than four or five feet across, if possible, and hung with paper in a Dresden design, one of those dainty floral patterns, such as are found on Dresden china, small scattered flowers in bright colors. The panels should be separated from the border by a half inch gilt moulding.

A very artistic ceiling, recently designed by one of our leading decorators, for a New York dwelling house has a large oval centre, painted in blue tones, shaded in such manner as to give a mirror-like effect. This part of the ceiling is flat, the balance being modeled in one of those plastic relief compositions which are coming into such general use. The corner pieces are a conventional treatment of the scallop shell intertwined with rococo ornament in low relief, forming an almost lace-like pattern. Round the oval centre, an egg and dart moulding is used as a sort of frame. This portion of the ceiling is in shades of warm yellowish brown, the high lights being touched up with gold. The whole design appears very quiet and rich, and though not brilliantly colored, the play of light on the delicate modeling of the relief work, with just enough gold to catch the eye and emphasize the sparkling light from the electric fixtures, gives more the impression of rich coloring than if the work had been done with a full palette of brilliant pigments, which might merely have produced an overwhelmingly gaudy effect, without showing those subtle variations in hue that can be obtained in a design worked out in colors approaching a monotone.

In the dining room of quite a new house, the walls are hung with Japanese leather, a thick, heavy paper, made by hand in that wonderful island of the far East, resembling somewhat in appearance rich old Spanish stamped leather, except that the designs covering the surface are decidedly Oriental in character, birds of paradise and wonderful flowering vines in an inextricable tangle forming the pattern. This leather paper has been carried up into the plain cove cornice, terminating just as it flattens out upon the ceiling, where it is separated from the plain felt ceiling paper, of the same leather colored brown, by a half inch moulding. The picture rail forms a frieze of the upper portion of the wall. All the woodwork is pine stained a light reddish brown in color, bringing into prominence the beautiful markings of its grain. The chandelier is black iron with yellow candles standing out boldly against the russet background. At one end of the room two china closets, built in the corners, with their glittering glass and porcelain, form bright spots, relieving the more or less sober, though rich appearance of the balance of the room.

The wall paper manufacturers are resorting to all sorts of expedients to produce novel and rich effects. One embossed paper which has a floral design covering the surface fairly well, has for the background fine gold lines about a sixteenth of an inch apart. In the petals of the flowers, which somewhat resemble open work embroidery, being embossed in raised lines having the appearance of corded work, very delicate embossed lines run either directly or diagonally across the gold lines, giving the impression of fine threadwork on a rich woven background. In another paper white roses in very high relief are embossed upon a pale buff ground, making a very charming design for a white and gold room.

Large figures seem to be growing in favor for wall-papers. One of those recently shown is covered with a series of panels, in which Watteau shepherds and shepherdesses are depicted watching the sportive little lamb, in the artificial manner of the days of Louis XVI. In another, on a leather-like background, large conventional flowers twine in and about shield shaped figures of a light color. Still another has gorgeous ornaments in red, blue and gold upon a buff background. It is rather gaudy, to be sure, but then in certain places large masses of bright colors may be used without being altogether objectionable.—E. H. BROWN, *Painting and Decorating.*

A Plea for the Use of White in House Painting.

Say what you will, my friend, in derision of the white house, it is to me the prettiest, newest and cleanest house ever painted, says V. B. Grinnell, in *House Painting.* Though it may be the subject of your sneers, philosophers, poets, sages and artists have dwelt quite content in the cottage painted white. See the white house in the distance, a bright gem among the trees in the valley, or standing like an emblem of purity on the hillside, making the leaves seem greener and the flowers look brighter by contrast. Look at the white house again in contrast with yonder glowing sunset, with all the glowing colors of forest, field and sky. Neither suffer by contrast. The red and gold of the sky and all the tints of field and forest look warmer, softer and purer as seen in contrast with the cottage robed in white.

As the sun goes further down and the bright colors fade to sombre grays, in clouds with silver edges, and "darkening shadows lie along the fields," the white cottage still stands in harmony with the scene.

White is a generous helper; all colors are made brighter by its presence. How it brightens the glow of the reds and deepens and intensifies the blacks! All colors and tints are enlivened by it. Then why, as in modern style, should we leave it out of every scheme of exterior decoration? Here in a white cottage is a bay window with foliage and flowers. How they glow in contrast with the white surroundings! How bright and pure the white stands out in contrast with the flowers and foliage! There is no inharmony here among all these colors. Now, stand here and look at a similar window in yonder cottage painted in colors. How the colors suffer by contrast with Nature's handiwork; they become dull and gross in presence of the bright flowers and verdant foliage. Not so with white: every brilliant flower and every beautiful and wonderfully colored leaf of the foliage plant, makes it stand out clearer and brighter. Then why banish white? While your colors are fading, thereby losing their beauty, white is growing whiter and brighter. While the bright green of the leaves and grass gives your olives a bilious tinge, white is made purer and brighter. While the bright flowers by contrast turn your reds a dirty brown, white is improved by their presence.

Defective Flues.

The burning of Mr. Vanderbilt's house at Newport is attributed to a defective flue, and with good reason, for the first appearance of the flames and their swift progress point directly to their source. That familiar agent of destruction causes an enormous loss of property every year, and involves the sacrifice of many lives, and there is not much sense in the jests with which the daily record of its work is embellished. Good humor is an excellent thing when it does not obscure the real nature of evils which ought to be removed instead of tolerated, and of tendencies which need to be rebuked rather than encouraged. Fires caused by bad construction are not the acts of God, but of fools and scoundrels. No man having a house built contracts for defective flues, which are sure, sooner or later, to reduce it to ashes, and possibly its inmates also. They are put in by persons who claim to be skilful and honest, and who are paid for doing their work thoroughly. But some of those who make the claim and get the job are criminally incompetent, and others are swindlers who think it profitable to take money which they haven't earned, inasmuch as there is only a remote chance of their ever being confronted with positive proofs of their rascality. Their work is put out of sight as soon as it is finished, and never appears again except in the light of a conflagration.

There is much wretched, conscienceless work going on constantly, and, moreover, it seems to be increasing instead of diminishing. It is not confined to any one class of productions, but extends all along the line from cookery to cathedrals. Appreciation of what is beautiful in form and surface may be more generally diffused than ever before, and indeed we think it is; but that essential element of intrinsic excellence which time and use disclose, is less common than it used to be. The prevalence of inferior workmanship is a serious, if not an ominous feature of the time, and the cause of it may profitably be investigated, not only by professors of social philosophy, but also by those who direct the manual work of the world, by the most sincere and intelligent of those who perform it, and by the leaders of labor organizations. The above is from *N. Y. Tribune.*

According to the *Chronicle Fire Tables* there were in this country in 1891 not less than 1439 original fires and 626 exposures caused by defective flues, involving a property loss of $3,049,060 from original fires, and $1,136,096 from exposure fires, making the enormous total of $4,185,156. Contractors cannot afford to let this sort of thing go on, for taking even the lowest grounds, that burned property creates a demand for new construction, we find that the insurance indemnity paid upon the foregoing losses reached only $2,389,182. But the loss, whether distributed by insurance or not, is absolute, as far as the general wealth of the community is concerned. Now we see that but a little over 50 per cent of the loss was covered by insurance. Just think of the stoppage to business, the hindrance to industry, the physical misery implied! And all for the lack of conscientiousness or knowledge in making chimneys so as to hold fire and heat without communicating to the rest of the building. This can be guarded against by proper thickness of walls, by thoroughness in mixing mortar and laying brick, by tile linings, by avoidance of wood furring, and by keeping headers and trimmers well away from the exterior of flues. All these precautions should be mandatory by law everywhere, and heavy penalties attached to neglect of them. Then would we have less of the destructive agency of the defective flue.

Antiquity of Glue and Veneering.

Among the many occupations of the carpenter that of veneering is noticed in the sculptures of Thebes as early as the time of the third Thothmes, who is supposed to be the Pharaoh of the Exodus, and the application of a piece of rare wood of a red color to a yellow plank of sycamore or other ordinary kind is clearly pointed out, says the London *Furniture Gazette.* And in order to show that the wood is of inferior quality the workman is represented to have fixed his adze carelessly in a block of the same color while engaged in applying them together. Near him are some of his tools, with a box or small chest made of inlaid and veneered wood of various hues, and in the same part of the shop are two other men, one of whom is employed in grinding something with a stone on a slab, and the other is spreading glue with a brush. It might perhaps be conjectured that varnish was intended to be here represented, but the appearance of the pot on the fire, the piece of glue with its concave fracture, and the workmen before mentioned applying the two pieces of wood together, satisfactorily decide the question and attest the invention of glue 3,300 years ago.

The Piping of Dwellings.

Some useful hints and suggestions are given by our contemporary, the *Mechanical News,* in regard to the placement of water and waste pipes in buildings in order to insure immunity from odors, leaks and bad sanitary effects.

The leakage of water pipes behind decorated walls and in fine ceilings is a sufficient argument against casing or covering service pipes. The repairs are generally costly in themselves, and they entail the additional services of the carpenter and decorator, as well as those of the plumber. Pipes in casings, or set in walls or partitions as they pass from floor to floor, provide especially inviting runways for mice, rats and vermin of all kinds. Nests are built in these places; scraps of paper, rags and food are carried into them, and they become filthy. It is only necessary to remove a covering board from almost any casing to prove this point in a most convincing manner. Even those in comparatively new buildings will be found surprisingly foul.

These casings, or wall pockets, as the case may be, serve another and usually unexpected purpose. They act as ventilators and distribute odors from the kitchen and cellar to all parts of the building. In the performance of this duty they are faithful and impartial.

Pipes carried openly through a building are not dangerous, because their condition can be constantly observed. If accidents occur the point at which the break takes place can be reached at once and repairs easily made. The quality of the work gains materially, because the plumber takes pride in putting up work which is to be exposed. He has natural and very justifiable pride in having the workmanship creditable to himself. This pride is increased by certain traditions of the trade, and there is a double gain to owner and occupant.

Exposed pipes may be made to pass through floors without leaving an opening. The floor around the pipe can be made perfectly tight and the passage of odors cut off completely—at least, as perfectly as the nature of the plaster will permit. This is an enormous gain, while the runways for rats and mice, roaches and water-bugs, are entirely done away with. These vermin can then be exterminated. This is practically an impossibility in houses where casings protect them and afford perfect breeding places. Cut off from free passages to all parts of the house they prefer more congenial quarters, where rapid transit and fields for colonization are provided.

As decorative features of the rooms cast pipes, at least, are often treated in a beautiful way. The body of the pipe is colored a very dark bluish gray, scarcely removed from black. The bands are silver or nickel bronzed, or have silver or nickel leaf applied to them. Occasionally the whole pipe is finished with two or three shades of bronze. Lead and wrought-iron pipe receive somewhat similar treatment. The lead is often polished and varnished. There is, however, no difficulty in making the decoration of the pipes strikingly effective.

It is satisfactory to know that architects and builders are beginning to break away from the old custom and expose their pipes wherever the prejudices of the owners can be overcome. Some of the best men in the profession are treating the plumbing work in a manner to show constructively its importance and value. The result is a great gain to both owner and occupant.

Collodion Glass.

From four to eight parts of collodion wool are dissolved in sufficient ether or alcohol; this solution is intimately mixed with from 2 to 4 per cent of castor oil or other non-resinous oil, and from 4 to 10 per cent of resin or Canada balsam. This mixture is spread on a glass plate, and dried under the influence of a current of hot air, by which it is transformed in a comparatively short space of time into a transparent, hard, vitreous plate, the thickness of which can be regulated as desired. The material thus obtained is said to resist the action of salts, alkalies, and acids, and, besides being transparent, is odorless. It is flexible and almost unbreakable. Its inflammability is much inferior to that of other collodion combinations, and it can be further reduced by the addition of magnesium chloride, while an admixture of zinc white produces an ivory appearance. Any color or shade may be imparted to the glass.

A SAW FOR FOOT, HAND OR STEAM POWER.

The illustration represents a new combination circular sawing machine, with self-feed ripping device, etc., for carpenters, cabinet, pattern, picture frame, box makers, and woodworkers generally. It is a very strong, substantial, and thoroughly well built machine, suitable for various kinds of work, in ripping, cutting off, mitering, rabbeting, grooving, gaining, dadoing, edging up, jointing stuff, boring, etc. It can be easily and quickly changed from a self-feed ripping machine to a cutting-off machine. It is made entirely of iron and steel, excepting the hard wood strips in the center of table, on face of gauges, top of treadles, and the drop leaves. The power is transmitted entirely by gears and a chain belt, doing away with any slipping or lost motion. All gears are cut by automatic machinery and run smoothly. The foot power has a walking motion, by which much greater power can be obtained with less fatigue than with any other kind in use, and it enables the operator to run the machine with both feet sitting, or one foot standing, as desired.

With this machine one man can rip soft wood up to 3½ inches and hard wood to 2 inches thick, doing the work of four men with the common hand saw, and it is equally as valuable for cutting off and various other kinds of work. It works accurately, saves time, lumber, and labor, and will pay for itself in a short time. Weight of machine, 420 pounds; boxed for shipment, 550 pounds. It is manufactured by the Seneca Falls Manufacturing Company, Seneca Falls, N. Y., who also manufacture a full line of foot and hand power machinery for wood and metal workers.

A New Court House at Greenville, Miss.

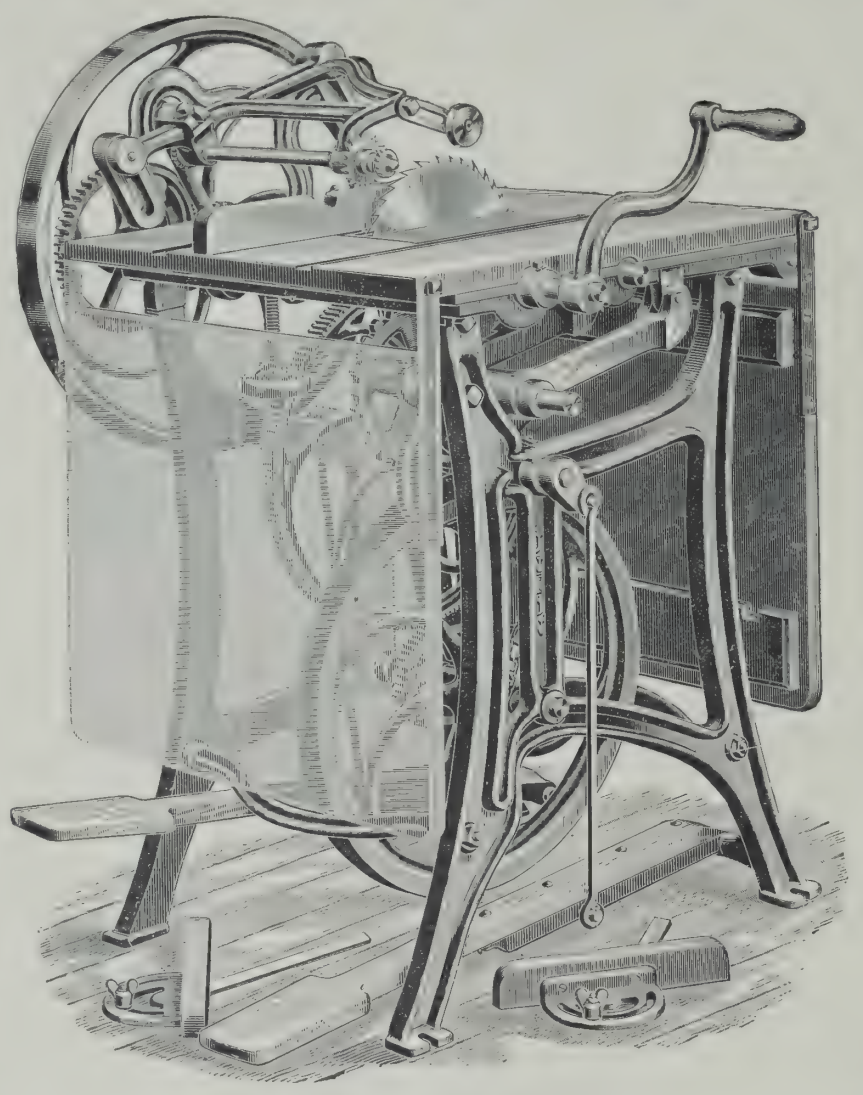
The Washington County Court House at Greenville, Miss., is nearing completion. It will be one of the finest buildings in that section of the country, being of the latest designs of architecture and having all modern improvements. The commissioners realized the advantage which metal has over woodwork, and they specified that the stairs must be of iron. This portion of the work is very artistic and ornamental, and made from original designs by E. T. Barnum, of Detroit, Mich., who for the past twenty-five years has been a leading manufacturer of art wire and iron work. Persons desiring goods in this line should write for illustrated catalogue.

A BALUSTER SPINDLE LATHE.

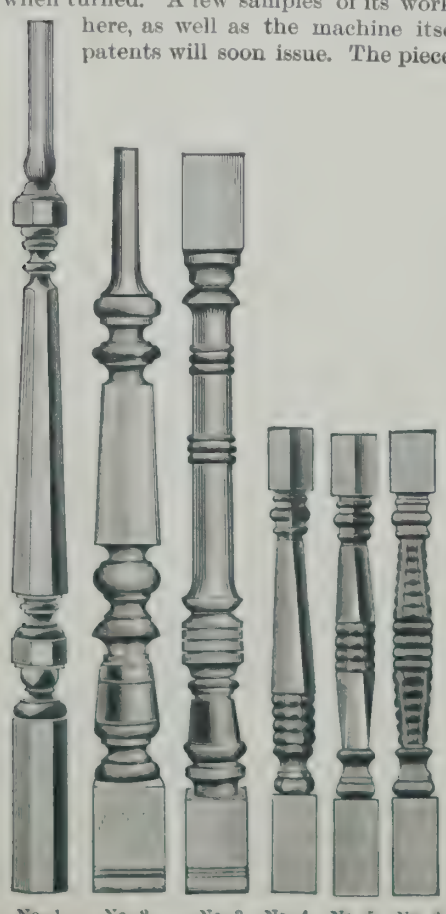
Balusters and veranda spindles turned square, octagonal, and oval, are now finding their way into the market competing with round and hand-turned work. A machine recently invented for doing this class of work is very nearly automatic in its operation, as it centers the piece automatically, dogs it, and releases it when turned. A few samples of its work are shown here, as well as the machine itself, for which patents will soon issue. The pieces are turned smooth, requiring no sanding for veranda spindles and outdoor work.

The same knives will turn a large variety of patterns by using different cams and by making a different arrangement of the heads. The knives used are ordinary moulding knives and their cost is not large. Among the novel designs turned upon the machine is the baluster No. 5, square at one end, a diamond at the other, and the center an octagon. The same set of knives is used to turn Nos. 4, 5, and 6. Besides balusters, the machine is adapted to turning table legs, chair legs, and spindles, neck yokes, singletrees, spokes, handles, etc.

The manufacturers of this machine are the I. E. Merritt Machinery Company, of Lockport, N. Y., who will give further particulars.



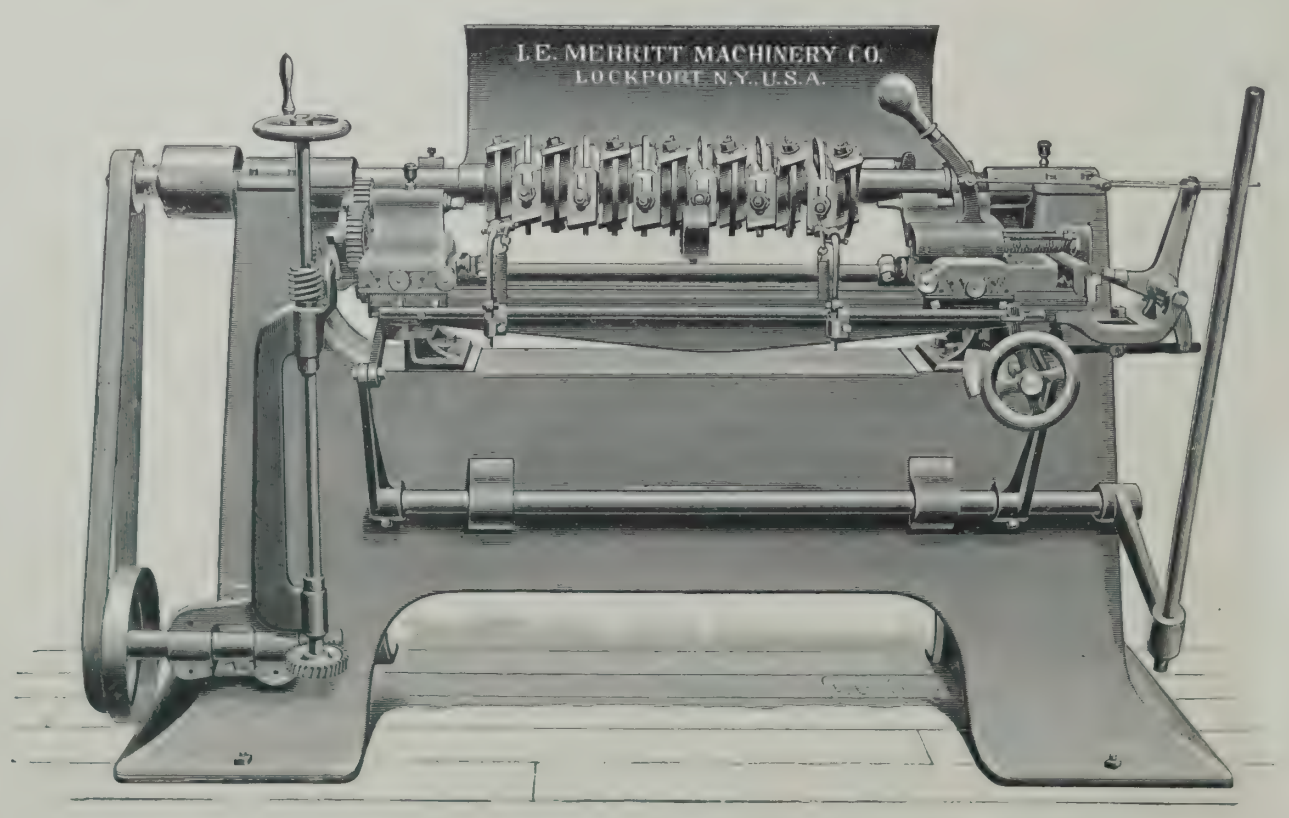
THE "UNION" COMBINATION SAW.



No. 1. No. 2. No. 3. No. 4. No. 5 No 6.

MACHINE-TURNED BALUSTER SPINDLES.

Messrs. B. F. Sturtevant & Co. have purchased the four-story building, 135 North Third Street, Philadelphia, Pa., the store and basement of which were heretofore leased by them, and are now refitting the store and putting in a complete line of stock of their different machinery. This branch has been placed in charge of Mr. C. H. Gifford, who has been connected for fifteen years with the concern at Boston.



A LATHE FOR TURNING BALUSTER SPINDLES, ETC.

Solid Partitions.

The "solid partitions" which the Peninsular Metal Works, of Detroit, Mich., are constructing in Chicago and St. Louis are attracting much attention. These partitions are only one and one-half inches thick when finished, and are strong and durable. The method of construction is as follows: Three quarter inch channel iron studs are erected, and securely fastened at top and bottom. These iron studs are placed 16 inches from centers, and are secured to door and window frames by screws. To these channel iron studs is wired "Peninsular Metal Lath." This metal, when in place, is plastered both sides with any quicksetting plaster or standard cement. The metal framework of the partition may be temporarily braced until the lower half of the partition is plastered one coat on both sides, when the bracing can be taken away, and the plastering can be proceeded with. Door and window frames are to be set up and braced as in any other style of partition. These frames should be same *thickness* as the partition, but may be any desired *width*. After the partition is plastered, these frames can be finished with mouldings to any desired thickness.

These partitions, with the meshes of the lath embedded in the center of this hard mortar, possess great strength, but their crowning superiority is due to the fact that they *economize room*. This is the great desideratum in office buildings, residence flats, hotels, and wherever else the building space is contracted. Of course they are absolutely fireproof. As to cost, they are represented to be 50 per cent. cheaper than tile.

These partitions are now in use (or in process of erection) in the Dexter Building, Omaha Building, Bradley Building, and many others in Chicago; the Goldsmith Building, Milwaukee; the Union Trust Building, the Portland, and others in St. Louis.

The National Hot Water Heater Co., manufacturers of the Spence heater, have recently removed their Chicago office from No. 34 Dearborn Street to No. 36. At present they occupy the whole of store No. 36 and the rear half of No. 34, and all their customers who visit the city will be cordially received there.

The Cordesman Machine Co., Cincinnati, O., report a good trade for their machines from all sections, but particularly from the North. They have just put on the market a new resaw and universal wood worker, both of which are already in active demand.

Barlow Brothers, of Grand Rapids, Mich., are now manufacturing two new manifold blanks of same style as their well known shipping receipts, the new blanks being a patent manifold tracer for tracing delayed freight shipments, and a patent manifold telegram. All shippers would do well to write for samples of these new blanks.



A RESIDENCE ON PARK PLACE, BRIDGEPORT, CONN.



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A RESIDENCE AT ST. DAVID'S, PA.



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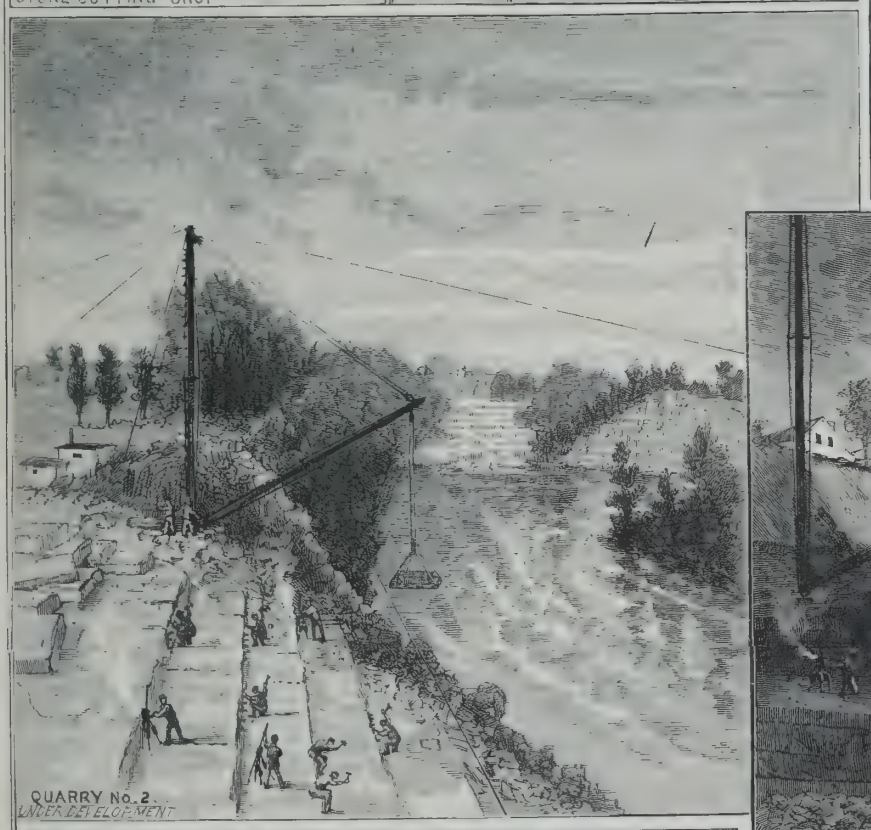
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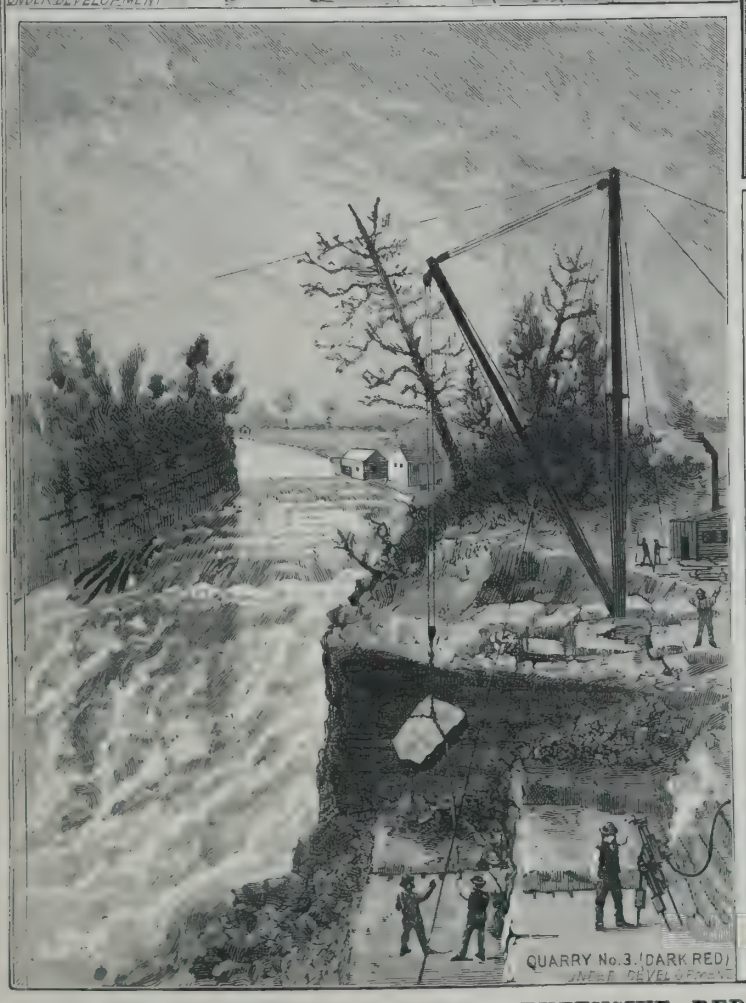
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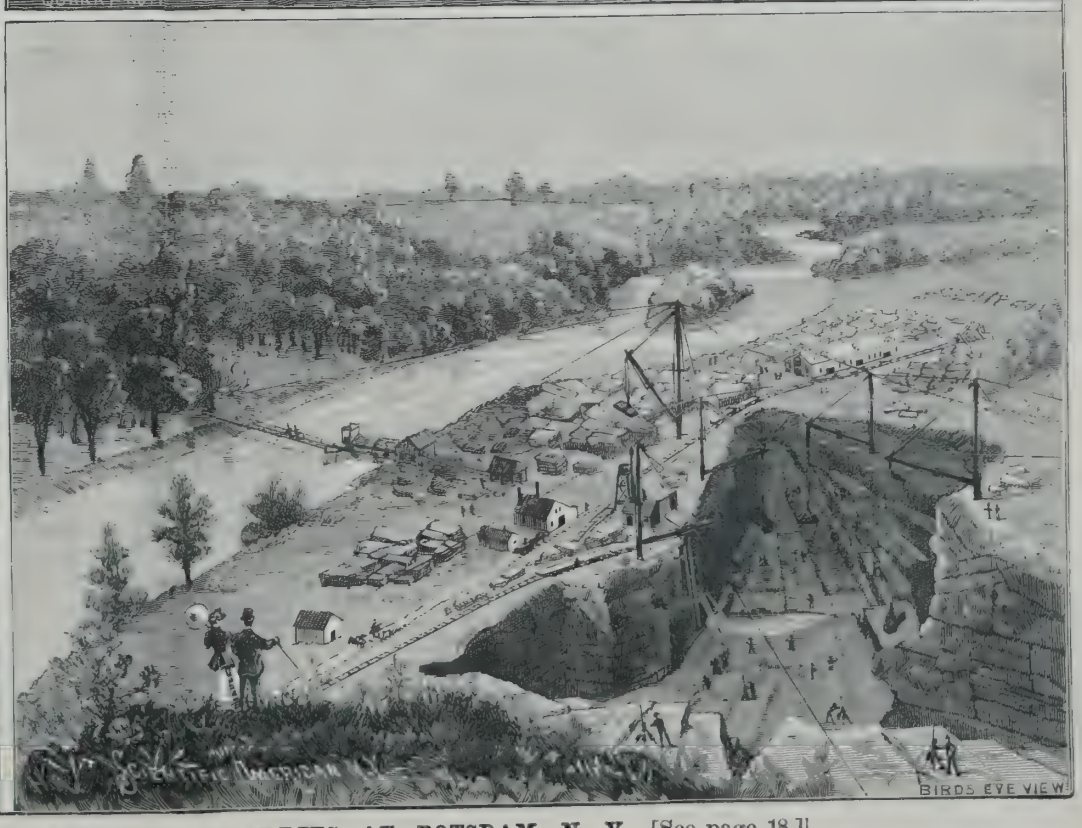












VIEWS OF THE EXTENSIVE RED SANDSTONE QUARRIES AT POTSDAM, N. Y.—[See page 18.]

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A RESIDENCE AT ST. DAVID'S, PA.

One of the plates in colors, this month, illustrates a residence recently erected for Charles S. Walton, Esq., at St. David's, Pa. The design is admirable. It has a very pleasing and picturesque appearance, with balcony, bay windows, porch, tower with Gothic windows, and terrace, which is a feature in itself. The first story, terrace wall and tower are built of rock faced stone laid up at random; second story is shingled and left to weather finish. Roof shingled and painted red. Dimensions: Front, 38 ft. 8 in.; side, 87 ft. 8 in. Height of ceilings: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The plans present a well arranged interior, showing many large rooms. The interior throughout is trimmed and finished with quartered oak, with the exception of third floor, which is trimmed with white pine, finished natural with hard oil. The main hall is 13 ft. x 19 ft. It is treated in the Gothic style. The ceiling is of oak, heavily beamed and ribbed, forming deep panels. These panels are pebble dashed. The fireplace is built of brick and terra cotta, with hearth laid of same. It is furnished with wrought iron trimmings of antique pattern, and is provided with seats and a carved mantel. The staircase of oak is fitted up with carved newels, and is lighted by windows, glazed with delicate tinted glass, shedding a soft and pleasant light over upper and lower halls. Both halls have paneled wainscoting. Parlor is spacious and well lighted. Library is provided with bay window, paneled divan and fireplace, trimmed with tiles, etc. Dining-room has a paneled wainscoting, and is provided with buffet and China closet combined. It is of Colonial style, with leaded glass doors, brass trimmings, etc. Rear hall, servants' dining-room, kitchen and laundry are wainscoted and fitted up with the usual fixtures respectively in the best possible manner. There are four bedrooms, sitting room and bath on second floor. Sitting room is provided with bay window and alcove with window seats; this alcove is separated by an arch, supported on Colonial columns with carved capitals. Bathroom is wainscoted and furnished replete. Third floor contains four bedrooms, bathroom, store room and a large linen closet. Cemented cellar contains furnace and other necessary apartments. The building is heated by steam. Mr. Horace Trumbauer, architect, Philadelphia, Pa.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE ON PARK PLACE, BRIDGEPORT, CONN.

One of our plates in colors, this month, illustrates a residence erected for E. W. Watkins, Esq., at Park place, Bridgeport, Conn. A second perspective view of the building is given on page 17, and an interior view on page 28. The design is very picturesque. It has many pleasing features, including the terrace, which is a novel feature, besides other bits of detail that are of interest. The terrace wall and underpinning are built of local granite, with dressed copings, etc. The exterior throughout is shingled and painted Colonial yellow with ivory-white trimmings. Roof slated. Dimensions: Front, 39 ft. 5 in.; side, 59 ft. 10 in., not including piazza and terrace. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The interior arrangement is excellent. Vestibule and hall are trimmed with antique oak. Vestibule has a floor laid with unglazed tiles. The hall is provided with ceiling beams and a paneled wainscoting nine feet in height. The broad staircase is turned out of similar wood, with carved columns extending to ceiling. Between these columns are placed transoms, filled in with spindlework. The large open fireplace is furnished with tiled hearth and facings, and a Dutch mantel with columns. Parlor, spacious, is trimmed with mahogany. It contains a bay window and fireplace, with Mexican onyx facings, tiled hearth, and a carved mantel with mirror, etc. Library, trimmed with cherry, contains a paneled wainscoting, bookcases, and fireplace. Dining-room is trimmed with oak, and it has a paneled wainscot, fireplace built of pressed brick and terra cotta, and a transom window glazed with cathedral glass. Kitchen and pantries are trimmed and wainscoted with oak, and are fitted up in a first-class manner. The second floor contains four bedrooms, dressing rooms, den and bath. Two of these bedrooms and dressing rooms are trimmed with cherry, the latter being provided with bath tub and bowl complete. The other apartments are trimmed with whitewood, stained and finished in red birch. Bathroom is wainscoted and furnished with the usual fixtures. The third floor contains billiard room and two bedrooms, besides ample storage. The floors throughout are laid with oak and highly polished. Cemented cellar contains laundry, furnace and other apartments. Messrs. Longstaff and Hurd, architects, Bridgeport, Conn.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A MODEL DWELLING AT HOLYOKE, MASS.

The engraving and plans, page 21, represent a model dwelling, recently erected for H. W. Cooley, Esq., at Holyoke, Mass. The design is pleasing and the plans are excellent. The underpinning is built of local brick. The building above, of wood, is covered on the exterior with clapboards and shingles, and is painted pearl-gray with white trimmings. Blinds painted bottle-green. Roof shingled and painted red. Dimensions: Front, 31 ft.; side, 47 ft. 6 in., not including front piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. Hall trimmed with quartered oak, contains an ornamental staircase with turned columns. These columns extend to ceiling and support a spindle transom. This staircase and hall are lighted by a stained glass window. Parlor and library are trimmed with sycamore; the latter is provided with an open fireplace, with tiled hearth and facings and a hardwood mantel. Dining-room is trimmed with antique oak. Kitchen and pantry are trimmed and wainscoted with yellow pine and finished natural. These apartments are fitted up with the usual fixtures replete. Stairs to cellar and second floor. The second floor is trimmed with white pine and is treated with delicate colors. It contains four bedrooms, den and bathroom. Bathroom is wainscoted and fitted up complete. Four bedrooms and ample storage on third floor. Cemented cellar contains laundry, furnace and other apartments. Cost $6,000 complete. Mr. F. R. Richmond, architect, Springfield, Mass.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A COTTAGE AT CRANFORD, NEW JERSEY.

On page 26 will be found illustrations of a cottage recently completed for Mrs. D. H. Morrison, at Cranford, N. J. The design is a mixture of Queen Anne and Colonial architecture. It has many pleasing features. The underpinning is built of pressed brick laid in red mortar. The stonework and arch to front piazza are built of rock faced red sandstone. The first story is clapboarded and painted olive green with bottle green trimmings; second and third stories are shingled and stained oak color. Roof shingled and left to weather finish. Dimensions: Front, 35 ft.; side, 39 ft. 6 in., not including piazza and bay windows. Height of ceilings: Cellar, 8 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. The several rooms, communicating as they do, make a most attractive vista of the entire floor. The hall is trimmed with ash, and the other apartments with whitewood. The broad, low, ornamental staircase and paneled divan are the features of the hall, while the old casement window with seat and antique mantel make the dining-room in keeping, and the several spindle transoms and leaded windows carry out the antique effect so successfully sought. The parlor is treated in ivory white and gilt, and it contains an open fireplace built of brick with tiled hearth and facings, and a Colonial mantel with columns, etc. Dining-room is stained and finished in cherry. The butler's pantry and store pantry are of sufficient size to contain the usual fixtures, drawers, shelves, cupboards, etc. Kitchen is wainscoted, and all the woodwork is finished natural. It contains all the improvements. There are four bedrooms, large closets and bathroom on second floor, and three bedrooms and storage on third. Bathroom is wainscoted and furnished replete. Cemented cellar contains furnace and other necessary apartments. Cost $5,000 complete. F. W. Beall, architect, New York.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A STONE CHURCH FOR $6,000.

Our engraving on page 27 represents the First Baptist Church, recently completed at Warberth Park, Pa. The design is unique. It is of the Gothic style of architecture. It is built of rock faced Chestnut Hill granite, of a grayish blue color, laid up at random in red mortar. Roof slated and finished with a tiled cresting. Dimensions: Front, 29 ft.; side, 69 ft. The interior throughout is finished with oak. The auditorium, 26 ft. x 57 ft., has a seating capacity of 280. It is lighted by stained glass windows, shedding a pleasant light over auditorium, altar and choir box. The pastor's study is placed conveniently. The basement contains Sunday-school room, two class rooms, and furnace room, besides other apartments. These apartments are furnished complete. Class rooms are connected to Sunday-school room by double sliding doors, and are so arranged that they can be thrown together at pleasure. Cost of church, exclusive of furniture, $6,000. Cost of furniture, $1,000 complete.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

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A RESIDENCE AT BRIDGEPORT, CONNECTICUT.

Our engraving, page 22, represents a residence recently erected for Charles E. Wilmot, Esq., on Clinton Avenue, Bridgeport, Conn. The design has many excellent features, and the lines are well broken by numerous bay windows, which give it a pleasing effect. The underpinning is built of rock faced bluestone, and the building above, of wood, is covered with clapboards and shingles, and painted light olive green with light brown trimmings. Roof shingled and stained moss green. Dimensions: Front, 42 ft. 6 in.; side, 48 ft. 9 in., not including front piazza and porch. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. Cemented cellar contains laundry, furnace, dark cellar, coal bins, and other necessary apartments. The interior throughout is trimmed with whitewood and finished natural. Hall contains an ornamental staircase with newel and candelabra. Parlor and library have cabinet mantels with beveled plate mirrors. Sitting room is provided with an open fireplace, built of brick and furnished with tiled hearth and facings and a hardwood mantel. Dining-room is stained and finished in oak. It has a buffet built in, with drawers, counter shelf and shelves inclosed with doors glazed with plate glass. Kitchen is wainscoted, and it contains all the improvements complete. Refrigerator is built in with outside entrance thereto. The second floor contains five bedrooms, large closets, alcove, dressing rooms and bath. The bedrooms, kitchen, and lower hall are provided with stationary wash bowls. Bathroom is wainscoted and fitted up replete. Third floor contains two bedrooms besides ample storage. The building is lighted by electricity, and is provided with electric bells and all the modern conveniences. Cost $5,900 complete. Mr. C. S. Beardsley, architect, Bridgeport, Conn.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT NEWTON HIGHLANDS, MASS.

We publish, on page 20, the perspective and plans of a residence recently completed for H. C. Robinson, Esq., at Newton Highlands, Mass., and from plans and specifications prepared by Mrs. Anna M. Cobb, same place. The underpinning to piazza and first story at tower is built of field stone, laid up at random in red mortar. The underpinning to the main building is built of rock faced bluestone. The building above, of wood, is clapboarded and painted pearl-gray with white trimmings. Gables are shingled and painted similar. Blinds painted bottle-green. Roof shingled and finished natural. Dimensions: Front 41 ft.; side, 56 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The hall, spacious, is trimmed with Florida cedar. It contains an ornamental staircase with carved newels. This hall has a paneled wainscoting and ceiling beams. Parlor and library are trimmed with whitewood, treated in ivory white. The fireplace in library is built of brick with tiled hearth and facings, and a hardwood mantel with mirror. Dining-room is trimmed with Florida cedar, and it has a paneled wainscoting, ceiling ribbed, forming deep panels, and an open fireplace, furnished complete. The other apartments throughout are trimmed with whitewood. The kitchen and rear hall are wainscoted and fitted up complete. The woodwork in these apartments is finished natural. An icebox is built in complete, and is placed conveniently. The staircase in rear hall has turned newels, balusters and rail. The second floor contains a spacious hall, four bedrooms, large closets and bathroom. These apartments are treated in delicate colors. Bathroom is wainscoted in cherry and is furnished replete. One bedroom and ample storage on third floor. Cemented cellar contains laundry, furnace and other necessary apartments. Cost $6,472 complete.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.



A RESIDENCE ON PARK PLACE, BRIDGEPORT, CONN.

A DWELLING AT HOLYOKE, MASS.

The illustrations on page 24 represent an attractive design for a suburban dwelling which has been erected recently for James S. Newton, Esq., on Linden avenue, at Holyoke, Mass. The design has many bay windows and a shady piazza. Foundation, stone. Underpinning, local brick, laid in red mortar. First story, clapboarded and painted light olive-green with bottle-green trimmings; second story and gables are shingled and stained sienna. Blinds are painted bottle-green. Roof shingled and stained moss-green. Dimensions: Front, 42 ft. 6 in.; side, 64 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in; second, 8 ft. 6 in.; third, 8 ft. A grand staircase with carved newels, a paneled divan, paneled wainscoting and an open fireplace are the features of hall. This hall is trimmed with antique oak. There are three windows on staircase landing, glazed with stained glass, which light the upper and lower halls with good effect. Fireplace is built of brick, with hearth laid of same. Toilet is placed conveniently. Parlor is finished in the Colonial style. It is treated in ivory-white, and it has a fireplace with onyx tile hearth, and a mantel of artistic design. The arch between parlor and library is provided with a transom filled in with delicate spindlework. Library is trimmed with cherry, and dining-room with oak. Each have open fireplaces handsomely furnished. China closet (8 ft. x 10 ft.) is fitted up with shelves, drawers, cupboards and butler's bowl. Kitchen and pantry are trimmed and wainscoted with whitewood, finished natural with hard oil. Icebox is built in and fitted up complete. The second floor is trimmed with whitewood, finished natural, and it contains five bedrooms, large closets and bathroom. Bathroom is wainscoted and fitted up with the usual fixtures complete. The third floor contains two bedrooms, storeroom and billiard room, handsomely fitted up with hardwood trim and floor. Billiard room, 17 ft. x 18 ft. Cemented cellar contains laundry, furnace and other necessary apartments. Messrs. Gardner, Pyne & Gardner, architects, Springfield, Mass.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

Architecture in Brick.

One of the most substantial and beautiful of surviving colonial buildings in the United States is the Pennsylvania Hospital in Philadelphia, occupying the block bounded by Spruce, Pine, Eighth, and Ninth Streets. It is an ample brick building, considerably more than a century old, and in a perfect state of preservation. A new arched wall of pressed brick attached to the building is defaced with a long crack, while the main structure stands apparently as sound as upon the day it was finished.

THE POTSDAM RED SANDSTONE QUARRIES.

A perfect building stone is far from being a common product of nature. To be qualified as a perfect building material, a stone must unite the qualities of resistance to weather and to fire, must be of good appearance and impervious to moisture. It should also not be of such a tint as to become dingy or of ugly color when exposed. The streets of this and other cities furnish the best possible example of defective building stones. Brownstone buildings are seen whose carved portions are disintegrating and the faces of whose smooth wall pieces are flaking off. To avoid this destruction various suggestions and experiments have been made either in the way of chemical treatment or of method of laying, but nothing seems to stop it. The experience of Boston and of other cities has demonstrated how poor a resistant to fire is granite. Granite is often a stone of handsome appearance, and will in some cases stand any amount of exposure to the elements, but it is very unsatisfactory in the presence of a conflagration. Although stone is everywhere recognized as the noblest and most desirable of building materials, yet so great has the difficulty of securing good stone become that many large buildings are built entirely of brick and terra cotta, the art of man being relied on to surpass nature.

The Potsdam sandstone is a member of the lower Silurian group and rests upon the primitive rocks of the Eozoic. This lower portion of the Potsdam formation varies from an absolute quartzite to a sand. In the present issue we illustrate the quarries at Potsdam, N. Y., from which this stone is extracted for building purposes. Here the famous sandstone is attacked at the place where it seems to be of the best average quality. A thickness of 70 feet is exposed in the quarries. At this point it is almost a quartzite.

The examination of a microscopic section of the rock discloses the following characters: It is found to consist of angular grains of clear quartz, quite unmixed with other granular material. There is no feldspar or mica intermingled with it. The interstices between the grains contain a cementing material. This is found to be a clear, colorless silicious cement, so that the rock is virtually silica. On this point, Professor Thomas Egleston, of the Columbia College School of Mines, and an authority on building stones in the United States, in a paper read before the American Society of Civil Engineers, on the decay of building stones, says: "Of the sandstones having a silicious binding material, Potsdam sandstone, which has been used in the recently constructed Columbia College [an engraving of which is published herewith], and the silicious triassic sandstone, which was the material used in the lower part of the cathedral at Rodez, are the best examples, and in these no decomposition takes place. Of these sandstones, it will be noticed that there are two general varieties, one in which the quartz grains are more or less large, and are rounded, but are cemented together by silica. . . . In the Potsdam sandstone, on the contrary, the grain of the quartz is quite small; its shape, when it can be distinguished at all by a magnifying glass, is always angular. . . . This is the best of all building materials, though mouldings made of the other variety (large grains) will last for many years without suffering any appreciable amount of deterioration."

The other sandstones vary greatly from this. In many cases the quartz grains which form a body of sandstone are mixed with grains of feldspar and mica, which in themselves present at least a chance or probability of decay. The cementing material also varies; it may be of argillaceous nature or may be even a calcium carbonate. As cements all these are defective. They always tend to yield to the weather.

As a weather resistant pure crystalline quartz would be the best of all materials. This, of course, being out of the question, the next best thing would be in the line of a flint rock or quartzite. To the latter type, the Potsdam sandstone is closely assimilated. It departs far enough from it to be workable. Although extremely hard, it can be wrought into all the shapes demanded by modern building, including the most exquisite carvings and mouldings. Its strength is very great. It has been tested on the Emery testing machine at Columbia College in this city, and proved to be of extraordinary compressive strength. Some pieces placed in the machine and subjected to stress broke at a little over 18,000 pounds to the square inch. This figure brings it as regards strength quite out of the range of most sandstones and limestones and makes it surpass the majority of granites. But one marble and one sandstone in a very long list approaches this strength. What is still more extraordinary is that two inch cubes from one of the quarries proved too strong to be broken by the testing machine, although the pressure was carried to 151,000 pounds. This test reduces to a compressive strength of nearly 43,000 pounds to the square inch, or more than double the strength of the best granite. This result, so extraordinary as to be properly termed an anomalous one, proves what the stone may be.



SELECTING LARGE BLOCKS OF STONE.

We have said that granite may be weather resisting. While this is very true, it may be equally true that other samples will fail to withstand the American climate. To determine, as well as possible, what the action of the weather, including a contaminated city atmosphere, might be on Potsdam sandstone, it has been tested by subjection to acid and sulphurous acid gas. Dilute sulphuric acid, after long action, dissolved only $\frac{2}{10\,0}$ of one per cent, or a mere trace, while some stones lost over six per cent. Sulphurous acid gas only changed its weight $\frac{6}{10\,0\,0}$ of one per cent. These two tests are designed to represent the action upon it of the city atmospheres. As a direct test, samples have



PARLIAMENT BUILDINGS, OTTAWA AND PRIVATE RESIDENCES BUILT OF POTSDAM RED SANDSTONE.

been repeatedly subjected to the severest freezing and thawing, and have remained absolutely unaffected.

In the vicinity of the quarries, buildings have been constructed of this stone, which have stood for over seventy years. Yet, exposed for this length of time to the trying climate of Northern New York, the stone has preserved its fresh appearance and has not yielded in the least, the tool marks being as clearly discernible as if made yesterday. Prof. Newberry has expressed the opinion that "had the obelisk now standing in our Central Park been composed of such a dense, homogeneous sandstone as Potsdam sandstone, it would to-day be as perfect as when erected at Tanis 1500 B. C." Here it may be noted that this very obelisk, which suffered so much on exposure to our climate, is made of granite.

We have spoken of the poor qualities of granite as a resistant of fire. The action of a conflagration upon granite is to cause it to flake off; walls composed entirely of this material may thus become so reduced in thickness as to fall. It is there that the qualities of Potsdam sandstone appear at their best. It is so absolutely fire-resisting, its granular structure so completely prevents it from cracking, that it can be heated to a red or white heat without injury. By many foundrymen it is preferred to fire brick for lining cupolas, and in the vicinity of the quarries is always used for lining lime kilns. The report of Prof. Wilbur, of Rutgers College, to Dr. Smock, the New York State Economic Geologist, showed that this stone withstood repeated heating to the temperature of melted copper, and sudden cooling, without injury or change of color—something which no other stone of the large number tested by him could do.

The qualities of Potsdam sandstone have been carefully examined and tested by men of the highest scientific standing. Dr. J. S. Newberry had occasion to examine the stone in 1890, and his report fully carries out all that we have said above. Dr. Newberry is professor of geology in Columbia College School of Mines; the opinion of his eminent colleague Prof. Egleston, who has charge of the department of mineralogy in the same great institution, is sufficiently indicated by the extract from his famous essay on the Decay of Building Stone, read before the Society of Engineers, which we give above. Prof. John C. Smock, New York State Economic Geologist, and Prof. Francis A. Wilbur, of Rutgers College Scientific School, are among the authorities we may refer to. Dr. Geo. P. Merrill, of the Smithsonian Institution, at Washington, is our authority on what we have said of the microscopic examination of the stone. In his new work on the Building Stones of the United States, Dr. Merrill says, referring to Potsdam sandstone: "I consider this, from the standpoint of durability, almost an ideal stone. It is practically non-absorptive, and its surface affords no foothold for growing organism."

Our illustrations of the quarries and workshops of the Potsdam Red Sandstone Company, of Potsdam, N. Y., tell their own story. They show the immense scale on which the operations are there carried on. From the everyday point of view a valuable feature is the large accumulation of ready quarried stone, nearly 100,000 cubic feet usually being carried in stock, including 40,000 or 50,000 feet of the famous Potsdam random rock-faced wall facings, cut ready to ship, so that contracts can be filled immediately on receipt of orders. This puts the business on a par with the brick and terra cotta makers, who from necessity are compelled to ship from stock, and absolutely avoids the proverbial delay in stone contracts, which is a standing joke among builders. Although it is the policy of the company to sell rough stone only, yet where local cut stone contractors refuse to make fair figures on work, their unrivaled facilities enable them to cut stone ready to lay in the building, and to set it if required in any part of the United States or Canada.

The peculiar stratification of the material as it lies in the quarries will be noticed. The natural beds are nearly perfect, which greatly reduces the cost of cutting. Immense blocks are got out almost of perfect shape, by the use of wedges and feathers, sometimes assisted by some of the patented methods of blasting. The equipment of machinery is of the most modern and complete description.

Dr. Newberry says: "The element of beauty is no less important in a building stone than strength and durability. In these three qualities this stone is certainly unrivaled."

The different quarries of the company afford a certain choice of color. The red stone is of an exceptionally pleasing and bright tint. About fifty feet of these layers is exposed in the quarries. Stone can be taken out from two to six feet or more in thickness, and can be wedged into any size from these thick stones, resembling granite in this. The company's quarries are distributed for about a mile up and down the Racquette River, and embrace the best outcrops of stone to be found in the district. Dr. Newberry reported, after personal examination, that these quarries were practically inexhaustible. We may, therefore, pronounce the company's quarries an almost ideal source of building material.

One of the cuts, showing a workman selecting dimension stone from stock, gives an idea of the form in which stone comes from the quarry. Another cut, showing the interior of a stone cutting shed, shows workmen getting out stoop rails and other forms.

Quarry No. 1, from which the main supply is derived, is shown in two cuts. The peculiar stratification of the stone is very noticeable. It is exceedingly regular, with sudden variations in the dip. The drainage of this quarry is effected by an undershot water wheel, shown in the bird's eye view to the left of the picture. From Quarry No. 2, now under development, a medium red stone is taken. This quarry, for a long time to come, will be self-draining, as will also be the case with Quarries Nos. 3 and 4. From Quarry No. 3 a dark red stone is taken.

The Racquette River, on account of falls and rapids, is not navigable, although it is the second largest river in New York, but great numbers of logs are floated down it every year from the Adirondack forests. A fall on their quarry property gives the company nearly twenty thousand horse power, the entire river falling about sixty feet, and this will be of great value in the future development of the business, giving by means of compressed air or electricity, ample power for the working of machinery now using steam, and for other purposes.

There is one product of the quarries which should be mentioned, the banded stone. Some layers are strongly banded in different colors. With these the most beautiful architectural effects can be produced. The combination of light, medium and dark red stone in solid colors and the banded variety gives great latitude to the architect in producing color effects. The colors harmonize excellently with granite or brick, and instances of this use are numerous. Among the buildings where the stone has up to this time been used for the whole or a part may be mentioned the Dominion Parliament buildings at Ottawa, shown in the accompanying engravings; All Saints' Cathedral, Albany; Columbia College, New York City; the New York State Asylums at Ogdensburg and Matteawan (costing over a million each), and numerous buildings in New York City, Brooklyn, Buffalo, Syracuse, Rome, Albany, Troy, Lynn, Washington, D. C., Rondout, N. Y., New Rochelle, N. Y., Ogdensburg, N. Y., etc., and many smaller cities and villages in the United States and Canada.

The quarries are situated near the line of the Rome, Watertown and Ogdensburg Railroad, and ship their product by the New York Central system in all directions.

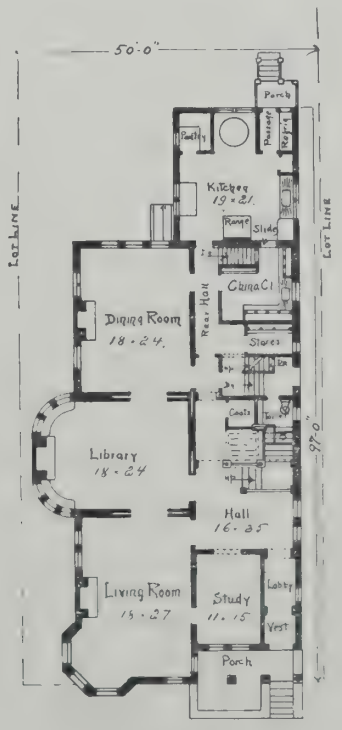


COLUMBIA COLLEGE, NEW YORK.

Architecture and the Phonetic Arts.

One-half of the errors in design, and nine-tenths of those of the theory of architecture, arise from mistaken analogies with other arts with which it has no real affinity, and from false theories based on these erroneous data. First, then, architecture has no affinity in principle with painting and sculpture. These arts are what are properly called phonetic arts; that is to say, are voices, or represent what may be expressed by words. But architecture has nothing to do with words. No amount of eloquence will build a house, and no conjuration of words will keep out the weather or warm the inside of a dwelling; words cannot make a house, and a building can only express very few and a limited class of ideas, and these only very imperfectly.





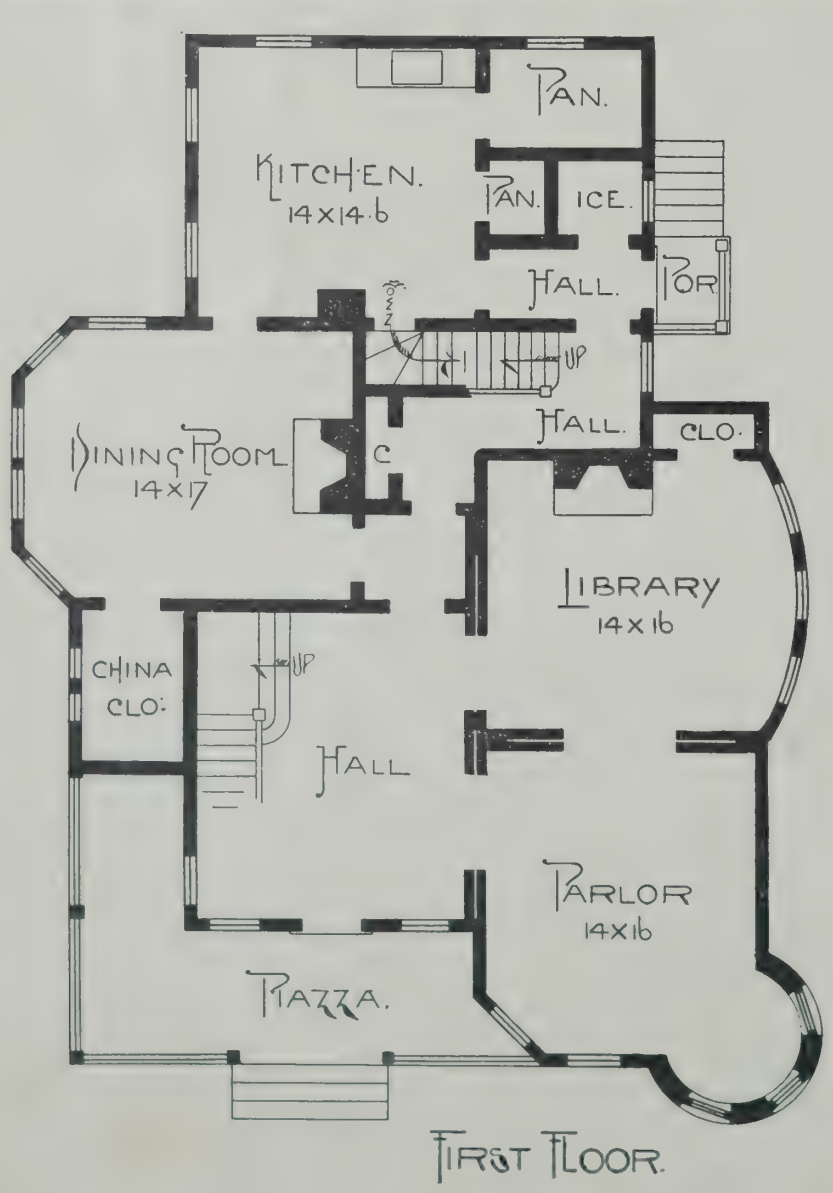
FIRST FLOOR



SECOND FLOOR

AN ARCHITECT'S RESIDENCE AT BUFFALO, N. Y.





First Floor.

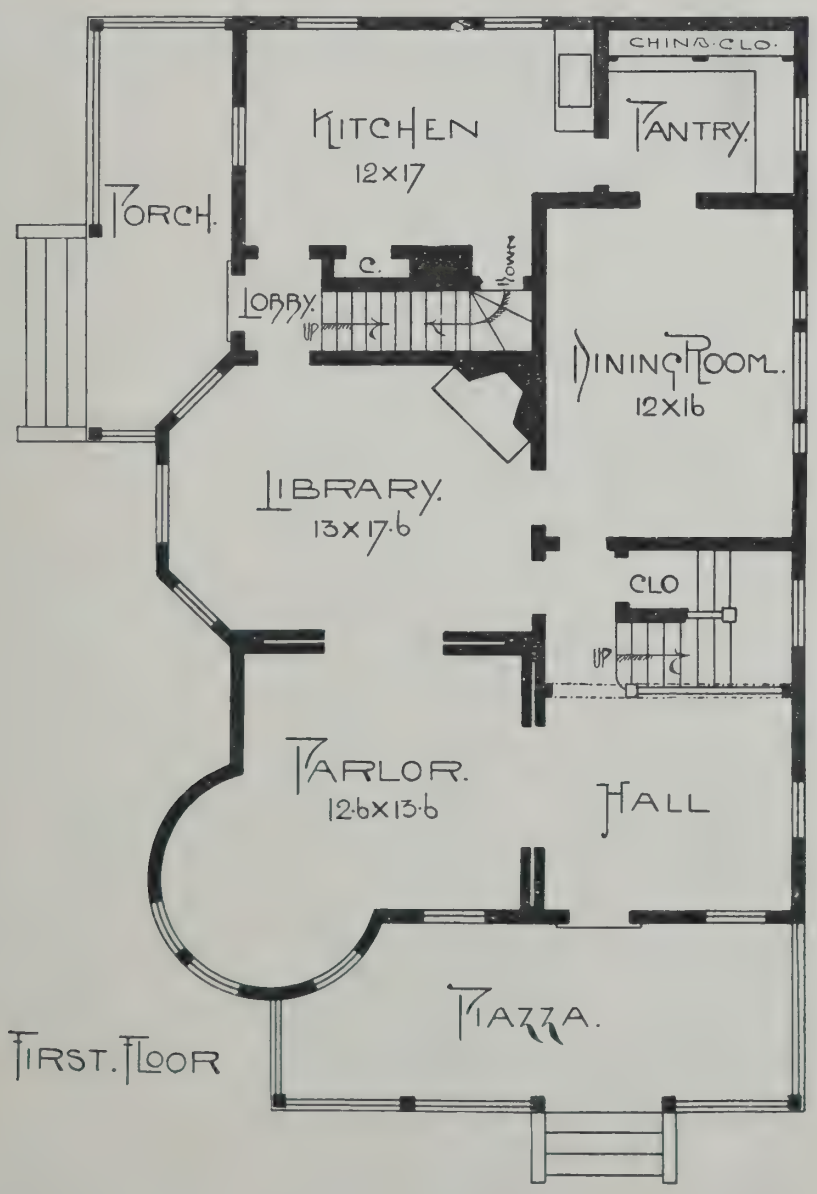


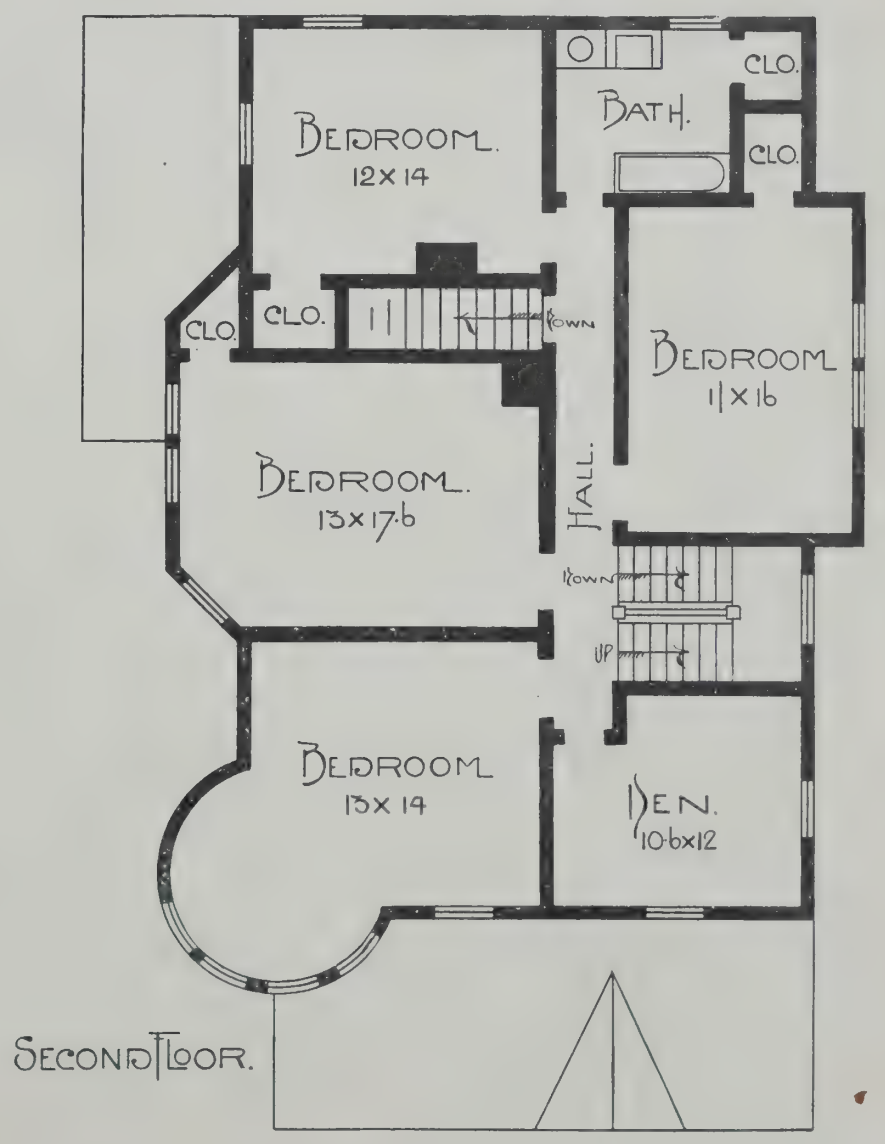
Second Floor.

A RESIDENCE AT NEWTON HIGHLANDS, MASS.—See Page 17.

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A MODEL DWELLING AT HOLYOKE, MASS.—See Page 16.





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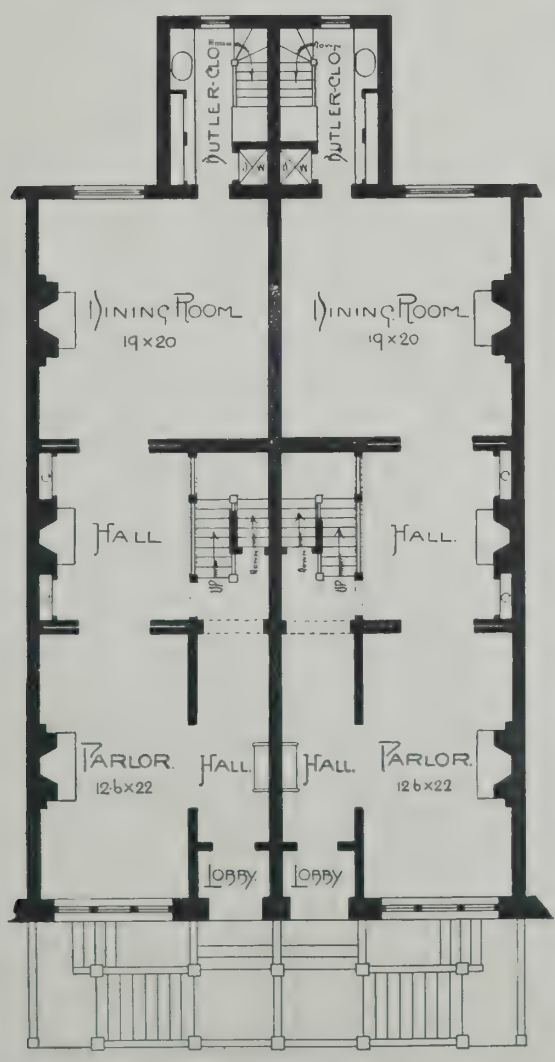


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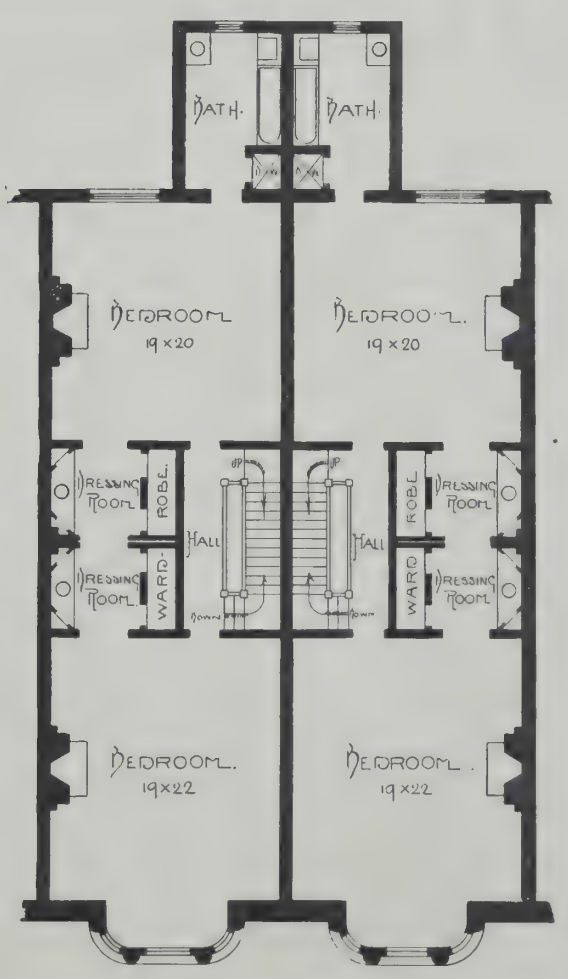
A RESIDENCE AT BRIDGEPORT, CONN.—See Page 17.

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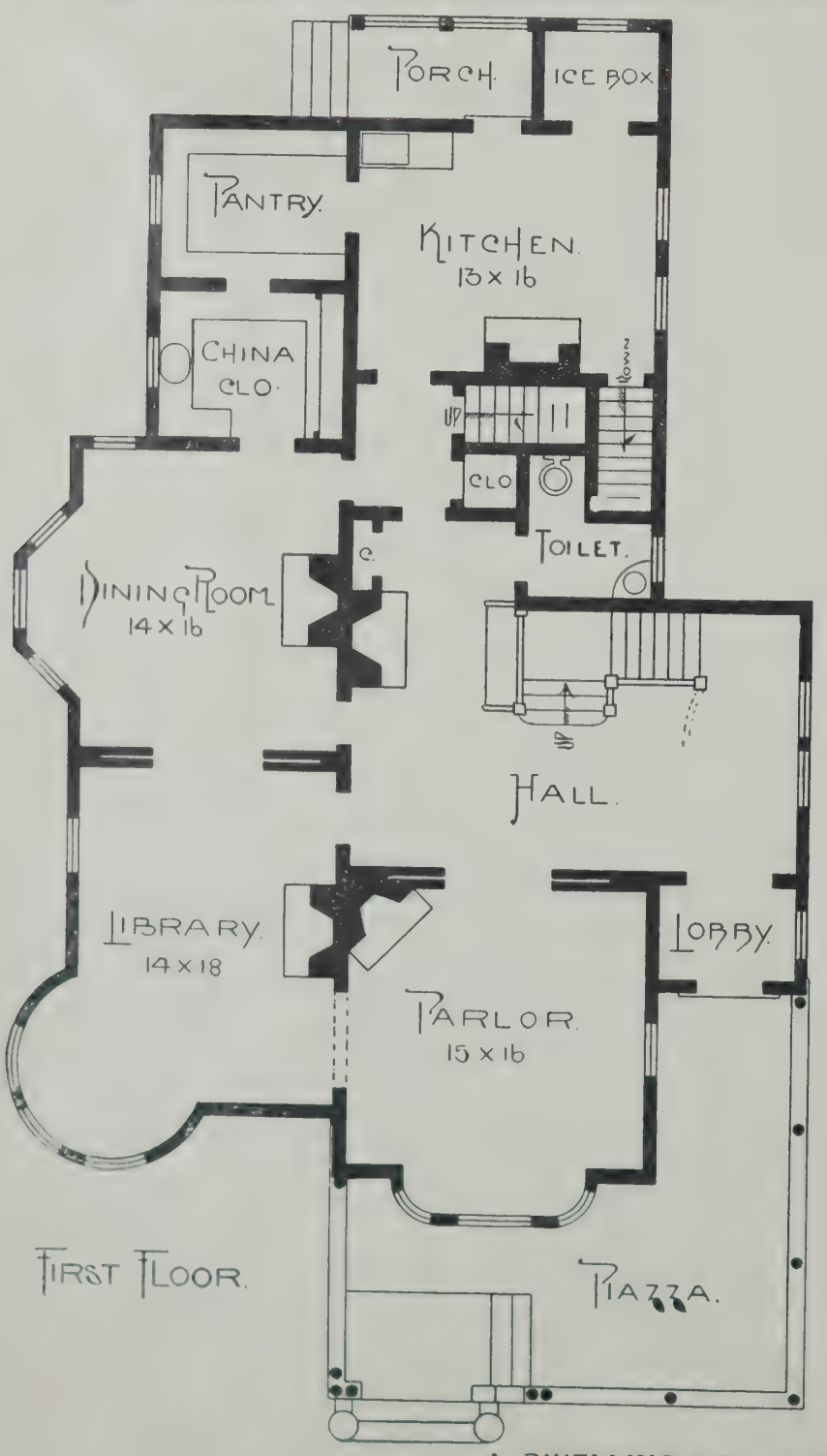


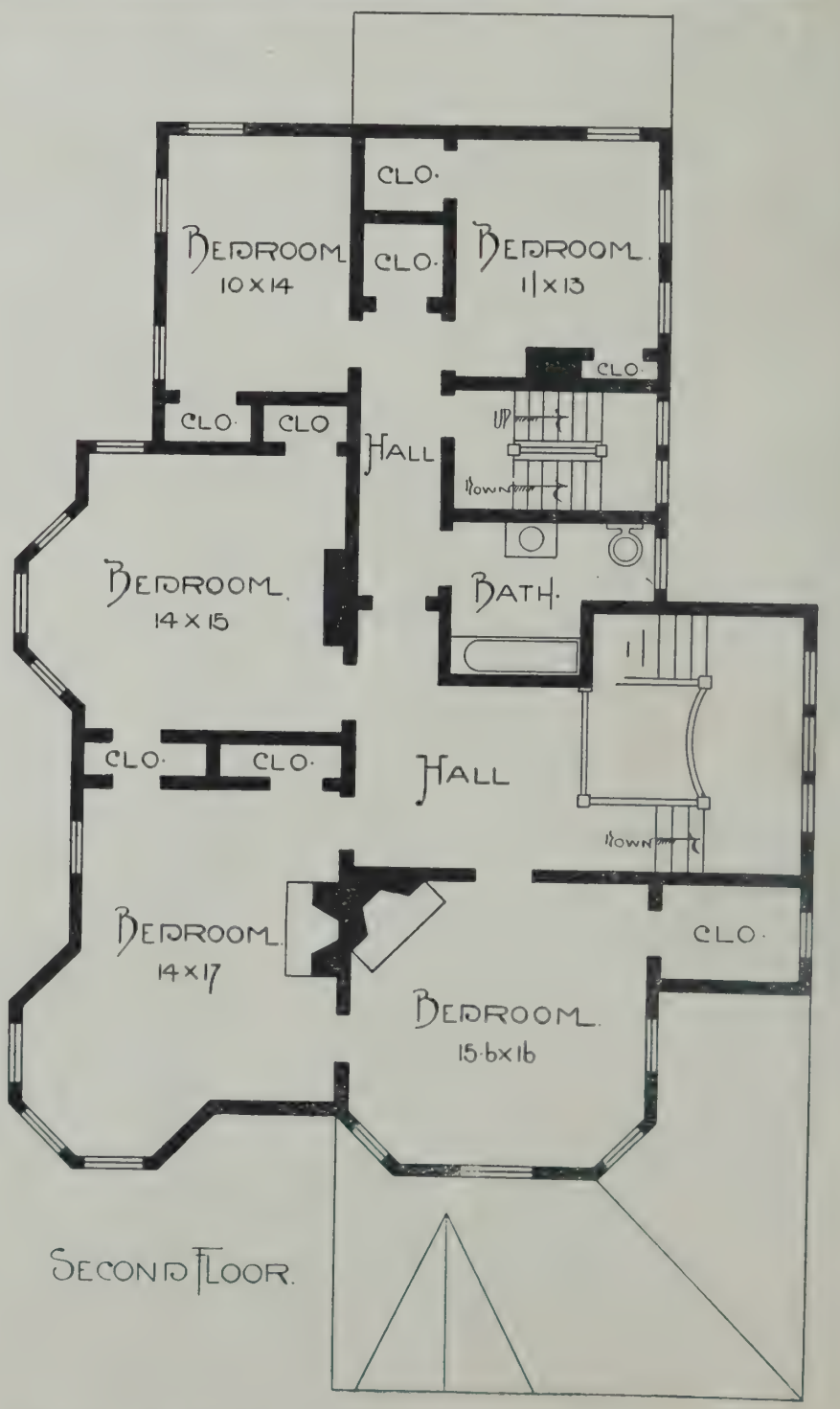
SECOND FLOOR.

A ROW OF WEST SIDE HOUSES, NEW YORK CITY.—See Page 28.

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A DWELLING AT HOLYOKE, MASS.—See Page 17.

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A COTTAGE AT ST. DAVID'S, PA.—See Page 28.

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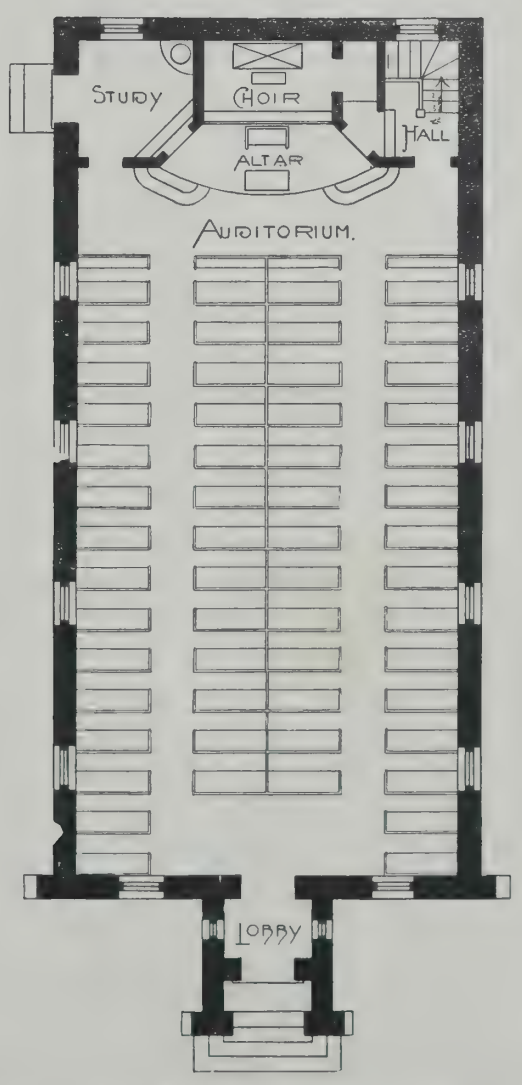


SECOND FLOOR.

A COTTAGE AT CRANFORD, N. J.—See Page 16.

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A STONE CHURCH FOR $6,000.—See Page 16.

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A ROW OF WEST SIDE HOUSES, NEW YORK CITY.

The engravings, page 23, represent a row of model dwelling houses, recently erected for Mr. Osborne, on West Sixty-eighth Street, New York. The design is exquisite. The houses are built of Indiana limestone, the faces left rough as they come from the quarry, except around the door and window openings. The door and window openings at first story are flanked on both sides with cluster columns with carved caps. The bay window at second story is handsomely carved, and the loggia or balcony over is also a pleasing feature. Roof is covered with red English tiling. Cemented cellar contains furnace and other necessary apartments. Basement, trimmed with ash, contains breakfast room, kitchen, pantries and laundry. Breakfast room has a paneled wainscoting and fireplace, while the kitchen and laundry are wainscoted and furnished with all the usual fixtures complete. Vestibule has a floor laid in mosaic. Vestibule, hall and foyer, and parlor are handsomely trimmed with mahogany. Parlor is provided with a cluster of three windows, with a transom over glazed with stained glass, and a fireplace with tiled hearth and facings, and a mahogany mantel with mirrors, etc. Hall has a paneled divan, with beveled plate mirror over extending to ceiling, a paneled wainscoting, parquet floor, ornamental staircase, with carved newels, and a fireplace furnished with tiles and mantel, and closets on either side. Dining-room is trimmed with oak. It has a paneled wainscoting, parquet floor and fireplace. Butler's pantry is trimmed with oak, and it is provided with cupboards, drawers, shelves inclosed with glass doors, bowl, dumbwaiter and stairway to basement. Second floor, trimmed with sycamore, contains two bedrooms, dressing rooms and bath. Bathroom is wainscoted with oak and fitted up replete. Third floor is treated in colors, and it contains two bedrooms, dressing rooms and bath, and the fourth floor contains three bedrooms and trunk roam. The front room (19 ft. x 22 ft.) on fourth floor can be used for a billiard room.

Our engravings were made direct from a photograph of the building, taken specially for the Scientific American.

A COTTAGE AT ST. DAVID'S, PA.

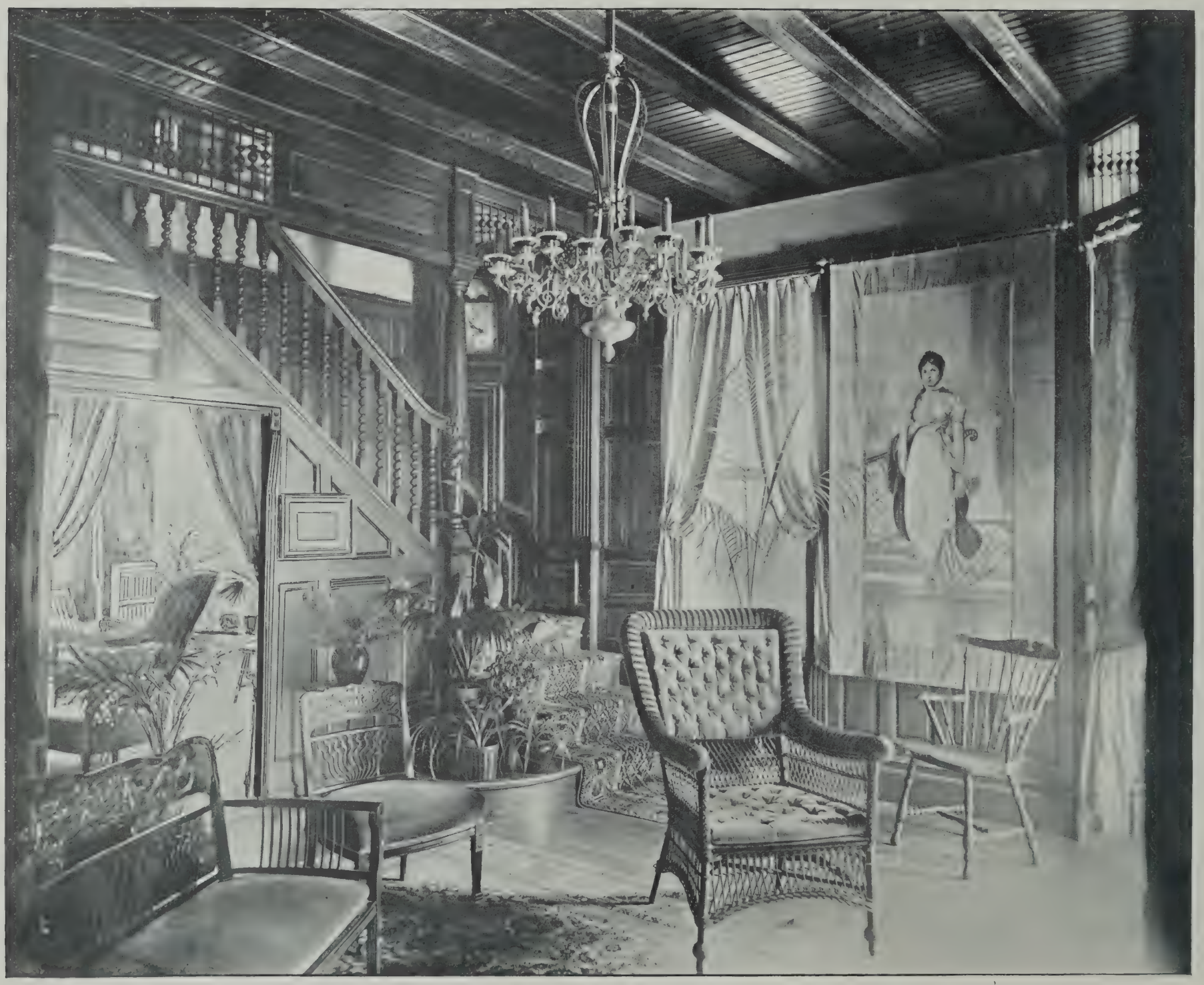
The engraving on page 25 illustrates a dwelling erected for Mrs. Conrad, at St. David's, Pa. The design is a mixture of Colonial and Queen Anne architecture. It combines a very artistic exterior with an unusually well arranged interior, which is handsomely finished and fitted up with the best improvements. The underpinning, balustrade to piazza, chimney and first story to the height of window sills are built of rock faced bluestone, laid up at random. The first story above this stonework is pebble-coated. The remainder of first story is clapboarded and painted olive green with bottle green trimmings. Second and third stories are shingled and painted a reddish brown. Roof shingled and stained moss green. The columns to front piazza and beams carried over are of oak, finished natural. Dimensions: Front, 39 ft. 6 in.; side, 47 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 8 ft. 6 in.; third, 8 ft. The first floor is trimmed with antique oak. The doors and windows have heavy moulded casings. The hall contains a staircase with carved newels. A novel effect has been produced by joining the back and main stairways and putting a glass window over both. Parlor is spacious and well lighted. Library is provided with an open fireplace, built of brick, with a tiled hearth and a hardwood mantel. Dining-room is provided with two China closets in either corner, with beveled glass doors, etc. Butler's pantry is fitted up replete. Kitchen and laundry are trimmed and wainscoted with whitewood finished natural, and provided with the usual fixtures complete. The second floor contains five bedrooms and bathroom, and the third floor contains two bedrooms and ample storage. These apartments are trimmed with whitewood. The floors throughout are laid with hard pine. Bathroom is wainscoted and furnished complete. Cemented cellar contains furnace and other apartments. Cost $5,100 complete. The architects are Messrs. F. L. and W. L. Price, 731 Walnut street, Philadelphia, Pa.

Our engraving was made direct from a photograph of the building, taken specially for the Scientific American.

The Housing of Workers.

Philadelphia, with a population of a million, has 187,052 dwellings, while New York, with a population of nearly two million, has but 81,828 dwellings. Every one who has visited either city must see, from these figures, how relatively simple the architectural problem is in the former city as compared with the latter. And for New York the question is much more complicated when the situation is analyzed somewhat. Of its 81,828 dwellings, 23,596 contain twenty-one persons or more. Of the whole population nearly one-half live in dwellings containing ten or more persons, while the 21,596 dwellings, just mentioned as containing twenty-one persons or more, house 1,010,737 persons, or two-thirds of the entire population of Manhattan Island.

To a certain extent this condition is necessitated in New York by the relatively small area on which the city is built. The development of a good rapid-transit system, and especially the providing of a swift and cheap transportation to New Jersey and Long Island, will do much to relieve the pressure upon the metropolis.—Barr Ferree.



A RESIDENCE ON PARK PLACE, BRIDGEPORT, CONN.

Concrete Roofs.

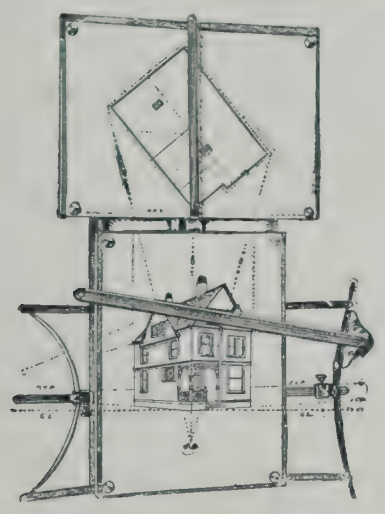
Flat roofs have several advantages, and can conveniently be constructed of concrete, with iron or steel girders at intervals. If the under side of the concrete has to be the ceiling of the room below, it may be desirable that it should be quite flat. In this case, the necessary falls and gutters can be formed with rough concrete laid on the top of the main body of concrete. The best material for finishing such roofs externally is asphalt.

Roman Temples.

The entrance of a Roman temple was, according to Vitruvius, if possible, always toward the West, which side was at the same time faced by the image of the divinity, so that persons offering prayers or sacrifices at the altar looked toward the East. If it was not practicable to build a temple in such a position, it was placed in such a manner that the greater part of the city could be seen from it: and when a temple was erected by the side of a street or road it was always so situated that those who passed by could look into it and offer their salutations to the deity.

AN AUTOMATIC PERSPECTIVE MACHINE.

The machine shown in the illustration is designed to facilitate the transferring of all points on plans to elevation without lines or measurements, and in a quarter of the time required in the old way. The frame is of wood and carries metal arms upon which slide grooved guides, to which are fastened steel springs which can be set to any desired radius by means of a gauge on the center arms. The center of said curve



JOHNSON'S PERSPECTIVE MACHINE.

or radius will be the vanishing points of the perspective to be drawn. By placing a common T square with the head on the outside of the curve or arc, with the blade across the board, it will be seen that where the blade stands horizontally across the board, the true horizon lines will appear, while if moved above or below this point, a line drawn along the blade will be at an angle to the horizontal, but always directly toward the center of radius or vanishing points. These curves can be set so the centers will be any desired distance from 100 to 10,000 feet from center of board or picture plane line. The point of sight is obtained in the same manner as horizontal vanishing points, and by means of a pin connection with point of sight rule and T square at the picture plane line any point on the plan can be transferred to the perspective without drawing any lines toward the point of sight or taking any measurements at the picture plane line. A. H. Johnson, Pontiac, Mich., is the manufacturer.

Drake's Columbus Drinking Fountain.

At a cost of fifteen thousand dollars, John B. Drake, proprietor of the Grand Pacific Hotel, and one of Chicago's leading citizens, is just completing in that city a public drinking fountain, which is regarded as one of the most ornamental creations of its kind in the world. The design is Gothic in style, and the material is a fine warm-tinted coral granite from Italy. The structure occupies a space on the north side of Washington Street, between the city and county buildings, and is 32 feet in height. Below the platform is a chamber which will hold three tons of ice, effectually cooling the water, which flows through coils of pipe below and around the ice.

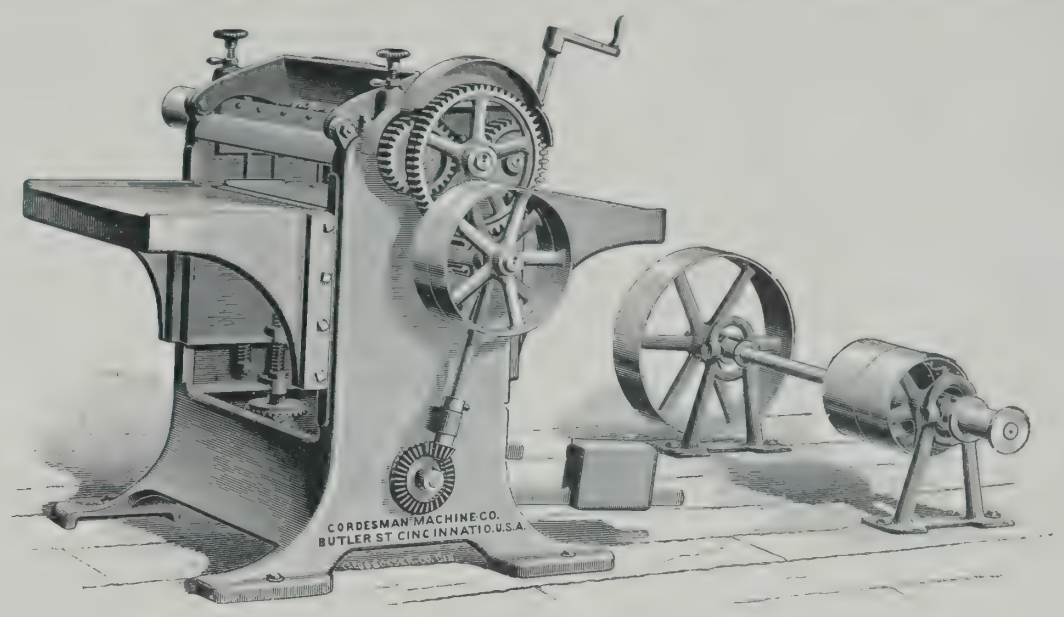
Mr. Drake has long felt that public drinking fountains in the populous parts of great cities would promote the cause of temperance in the best possible way. Let Mr. Drake's good example be followed by citizens of other cities and towns.

Sleigh Bells.

In making the bell the jinglet of iron is placed inside a little ball of mud, just the shape of the inside of the bell. Then a mould is made of the outside of the bell. This mud ball is placed in the mould and the metal poured in. The hot metal dries the dirt so it can be shaken out after casting, leaving the jinglet within.

A PLANING MACHINE REQUIRING LITTLE ROOM.

The machine shown in the illustration requires little power and room, and is exceedingly heavy, strong, and substantial. It is especially adapted to the wants of job shops, bracket, buggy, furniture, panel, and

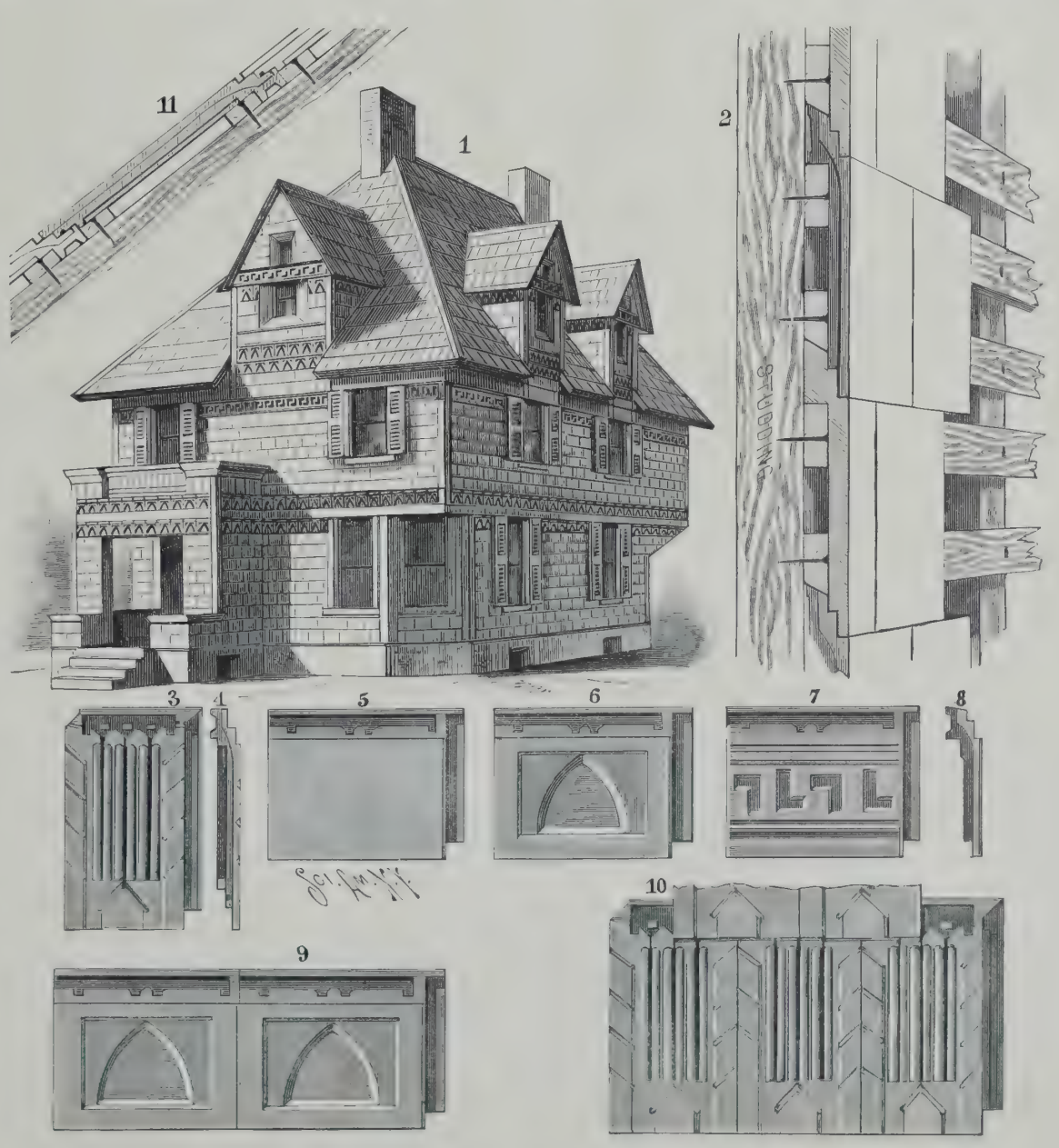


THE CORDESMAN MACHINE CO.'S PONY PLANER.

cigar box factories. The frame with cylinder and roller boxes is cast in one solid piece heavily braced and well proportioned, securing a perfectly rigid and compact machine. The table is fitted to the frame in an improved manner, having four bearings, each 14 inches long, provided with adjustable dovetailed gibs for taking up wear, so located that it secures a perfectly steady table, capable of producing the smoothest and truest work, adjusted vertically by means of crank handle, which is in easy reach of operator. An index on side indicates at a glance the thickness to be planed. The cylinder, with journals, is a solid crucible steel forging accurately turned and balanced. The rolls are all of forged steel, 3 inches in diameter. The upper rolls are powerfully geared, and will produce a strong and reliable feed. A countershaft is furnished with each machine, which can be bolted either above or below the floor. The tight and loose pulleys are 10 inches in diameter and 5½ inch surface, and should make 1,050 revolutions per minute. For further information relative to the machine address the Cordesman Machine Co., 24 to 34 Butler Street, Cincinnati, O., U. S. A.

AN IMPROVED SIDE AND ROOFING TILE.

A house which is both sided and roofed by an improved form of tile, with details of the tiling itself and the manner in which it is placed in position, are shown in the illustration herewith, the improvement forming the subject of two recently issued patents. This tiling is made and put on so as to form tight joints and a smooth surface, the separate tiles being removable, when required, without breaking, as nailing is not necessary. They are also designed to afford the maximum of strength without exceeding the average weight per square of tiles now in use as roofing, while the face designs of the siding may be so various in pattern and colors that the architect is enabled to arrange an almost infinite variety of combinations.



MARVICK'S SIDE AND ROOFING TILE.

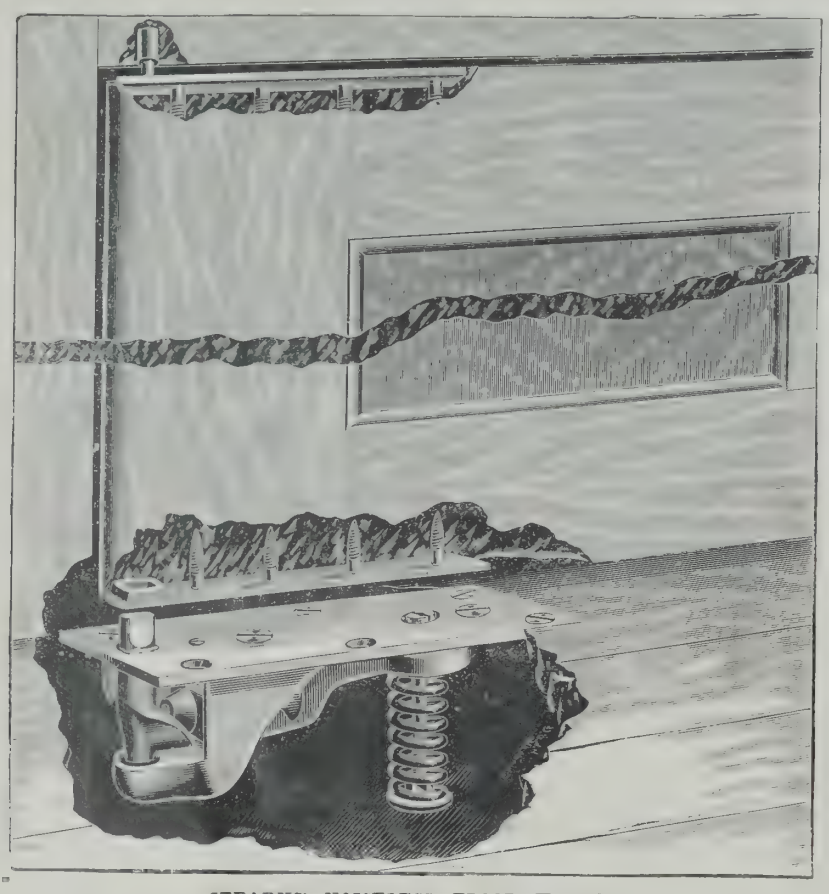
In Fig. 2 is shown a sectional view of a side wall, illustrating the manner of suspending the tiles upon laths nailed to the wood studding, cleats slightly beveled on their lower edge being nailed to fit tightly above each row to secure the side tile in position. These cleats are not required to be beveled for roof tile. Figs. 5 and 6 represent plain and ornamental siding tiles, Fig. 9 indicating their finished appearance in position, while Fig. 8 is a sectional view and Fig. 7 is an ornamental coarse strip, border, or moulding. Figs. 3 and 4 are front and side views of the roofing tile, Figs. 10 and 11 being similar views of these tiles in position on a roof.

It will be seen that these tiles have flanges, whereby water is prevented from passing into the joints at the sides and upper edges, the lower edges of the tiles above hanging clear of the upper edges of the next lower tiles, portions of the upper surfaces of the roof tiles also having deep grooves leading downwardly from the upper flanges to convey water to the outer surfaces. The upper flanges of the tiles also have stops opposite the upper ends of the grooves to prevent water and snow from being blown upward. Portions of the face of the roof tiles also have diagonal side grooves conveying the water toward the larger channels centrally in the face of each tile.

These tiles may be made of such sizes that all cutting around doors and windows will be obviated. Among their advantages over the ordinary wood siding is the fact that they are fireproof, while they require no painting, and their durability and elegance are obvious. Further information relative to these tiles may be obtained of Messrs. F. N. Marvick & Co., San Mateo, Florida.

AN IMPROVED SPRING HINGE.

The hinge shown in the illustration is especially designed for use on inside double-acting doors. It is manufactured by Messrs. E. C. Stearns & Co., of Syracuse, N. Y. The operating mechanism is attached to a plate let flush into the floor, a socket plate on the bottom of the door having an opening which fits over the stem of a cam held just under the floor plate. A plate on the top of the door has a projecting pivot to be inserted in a brass thimble driven into the upper casing. The tension of the spring which governs the closing speed of the door is controlled by a regulating screw adjustable from the surface. The door may be readily taken down without removing any part of the hinge.



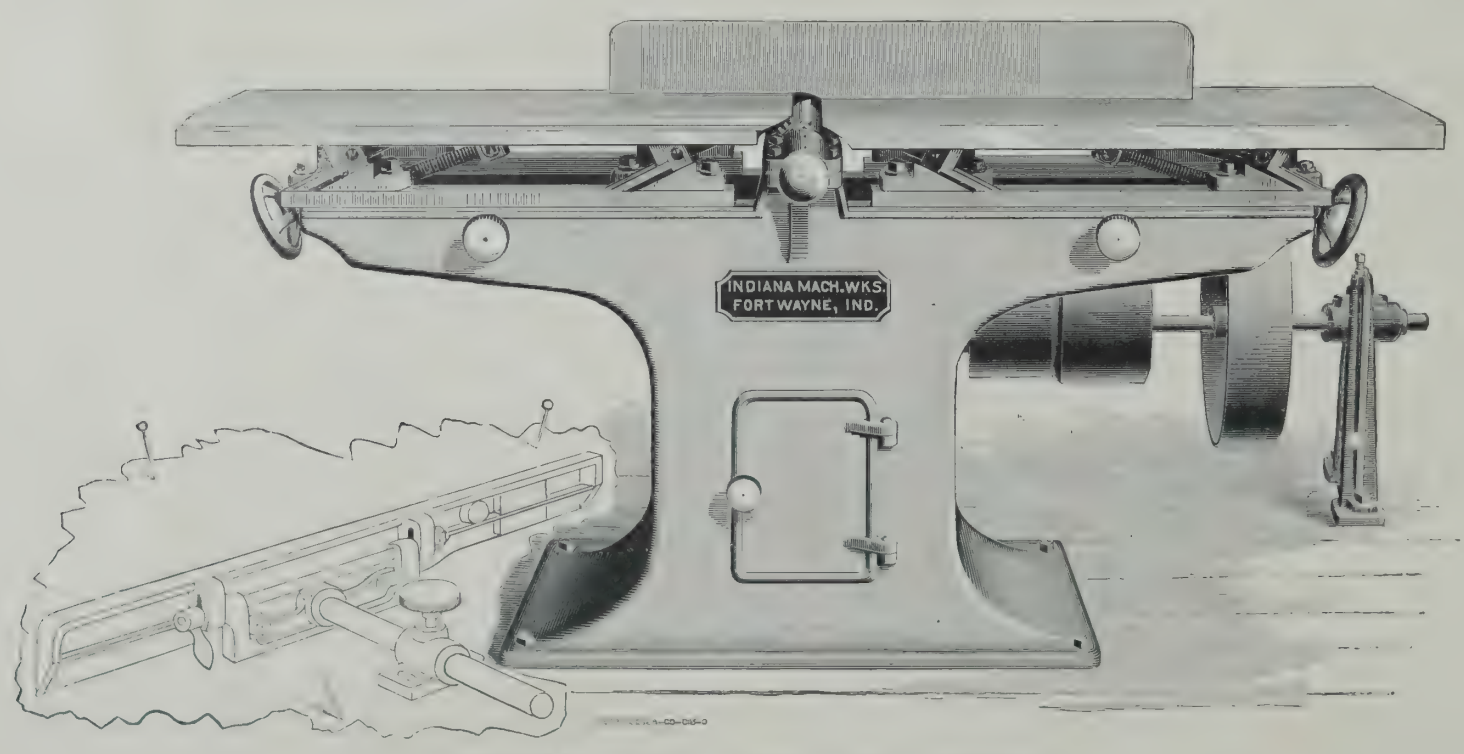
STEARNS' NOISELESS FLOOR HINGE.

AN IMPROVED HAND PLANER AND JOINTER.

The machine shown in the illustration has patent gauge, with tables 6 ft. long, and is made to plane 8 in., 12 in., 16 in. and 24 in. wide. It is made in four sizes, and designed with special care for planing out of wind, beveling, chamfering, grooving, rabbeting, making flat mouldings, etc. Wood workers desiring a heavy first class jointer, adjustable almost instantly for the various kinds of work of which it is capable, should give this machine their attention.

The cylinder is made of forged steel, has large journals revolving in long "self-oiling" babbitted bearings securely cast to frame, the caps of same being held down by four heavy steel bolts to each. The end of bearing on operating side is provided with a shield, to prevent oil from getting on operator's clothes. The body of cylinder is of the smallest proportions consistent with strength; therefore, describes a very small cutting circle, requires but little power to run it, produces a beautifully and quickly finished drawn cut, prevents slivering, makes a small gap between tables and greatly lessens the danger to operator, to any of which facts any expert will testify. Cylinder pulley is 4″ × 4″ and may be belted from any angle.

The tables are heavy, thoroughly ribbed, measure six feet from out to out, and the rear one has a recess planed on one edge, so that rabbeting up to ½″ deep may be done. Tables are adjustable on inclines with speed and ease by hand wheels and screws placed convenient to operator, this movement being the simplest, most accurate and least liable to get out of order. Gibs are used to clamp tables to inclines, insuring a close fit. Any wear in the former can be taken up. Inclines are securely bolted to planed surfaces on sliding frames and the latter fit into dovetailed planed ways on main frame. One turn of small hand wheels shown on side of machine permits tables to be instantly withdrawn from, and free access had to the cylinder, making it convenient to reset, replace or to use oil stone on the knives. This is a new machine just brought out by the Indiana Machine Works, Ft. Wayne, Ind.



IMPROVED HAND PLANER AND JOINTER.

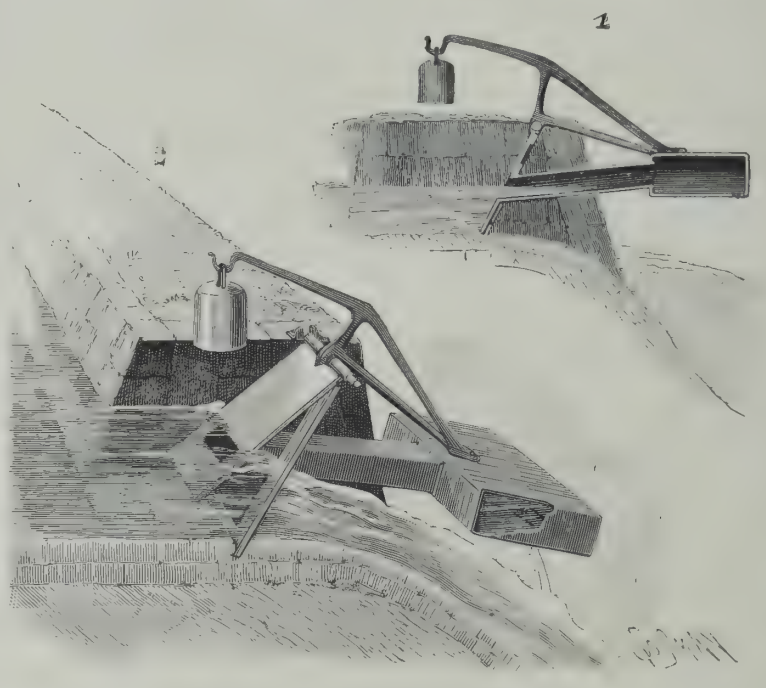
The use of rubber tires on private carriages has become quite common in this city. For invalids and nervous persons our physicians recommend their use. But the rubber tire is not only expensive, but lasts only a little while, owing to our rough pavements and street railway tracks. Why will not some one invent a cheaper substance than rubber, which will be more enduring, cost less, and be sufficiently elastic to meet the requirements?

To Darken Oak.

Oak for decorative wood work is produced by fumigating the material with ammoniacal vapor, which effectively produces the dark coloring so much desired. In accomplishing this, the method consists in placing the material to be darkened in an approximately air-tight room in which no light enters; or for small work a packing box will suffice, the joints or cracks to be well pasted over with paper. In this room or receptacle for depositing the furniture or other articles is placed a flat porcelain or earthen vessel filled with ammonia, the vessel containing the liquid being, of course, set on the ground or floor, that the fumes or vapor may strike to advantage the articles to be darkened; if the apartment is large, two or more vessels containing ammonia may be employed and allowed to remain until the desired effect is secured. The ammonia does not touch the oak, but the gas that proceeds from it acts in a peculiar manner upon the tannic acid contained in oak, browning it so deeply that a shaving or two may actually be taken off without removing the color. The depth of shade depends upon the quantity of ammonia used and the duration of exposure.

AN IMPROVED AUTOMATIC WATER GATE.

A waste gate which works automatically to control the overflow of wasteways or sluiceways of canals is shown in the accompanying illustration. The gate is designed to normally stay closed, opening automatically only when the water has risen to a certain predetermined height, when, by permitting the surplus water to escape through a suitable raceway, any damage likely to be caused by the water overflowing the banks is prevented. The improvement has been patented by Mr. George W. Norton, of Mohawk, Arizona Territory. Fig. 1 is a vertical section of the improvement, as applied in practice, the gate being closed, while Fig. 2 is a view in perspective, showing the gate opened by the rise of the water. In the wasteway is fitted an open gate frame, the top of the frame at the sides having bearings in which is journaled a cross-shaft to which is rigidly attached a swinging gate, and a counterpoise whose balance is changed by the rise and fall of the water. The counterpoise is secured at one end to a tank connected by a pipe to an opening in the gate, and on its other end is suspended a weight, whereby the gate will be held closed when the water is at a normal height, the tank at such times being empty. But with the rise of the water the tank fills, as shown in Fig. 2, and it then overbalances the weight and swings downward, thus opening the gate. The gate will remain open until the water falls below the opening leading to the tank, a small aperture in the bottom of the latter soon discharging it of its weight of water after the inflow has ceased, when the weight on the other end of the counterbalance pulls it down and closes the gate.



NORTON'S AUTOMATIC WATER GATE.

A ton of coal yields nearly ten thousand feet of gas and makes coke besides.



A RESIDENCE AT SPRINGFIELD, MASS.





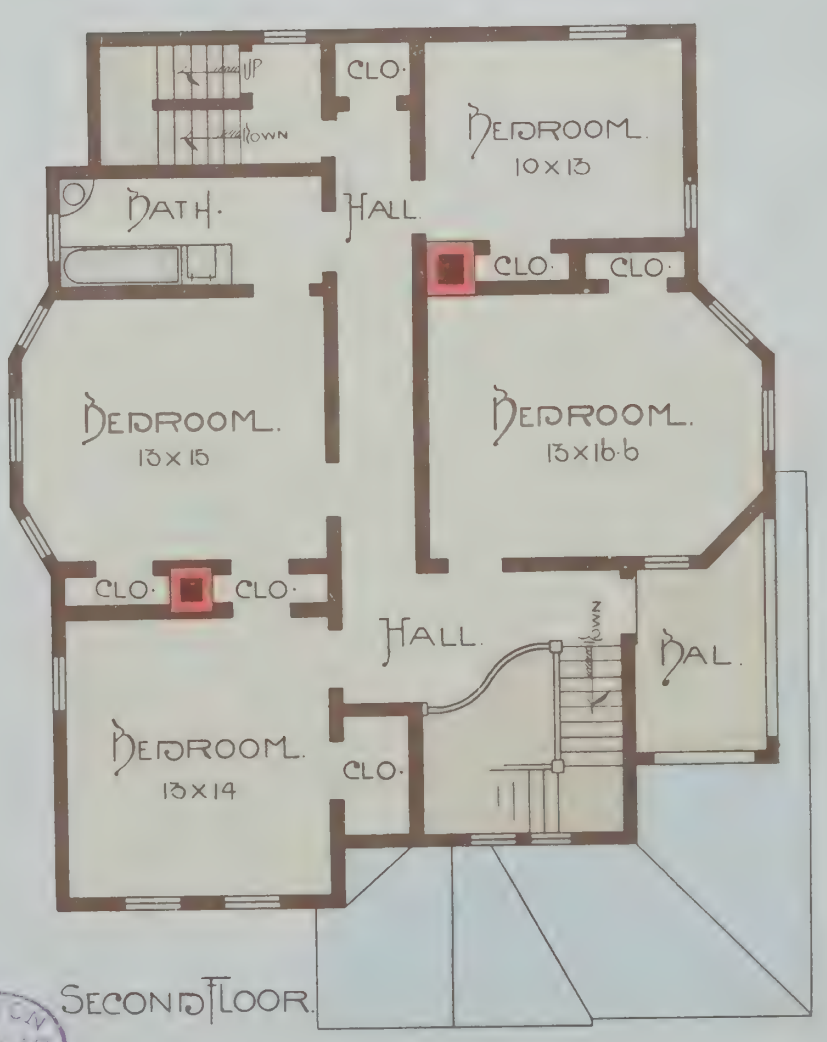
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A RESIDENCE AT BRIDGEPORT, CONN.



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A RESIDENCE AT BRIDGEPORT, CONN.—See Page 32.

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THE

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A RESIDENCE AT SPRINGFIELD, MASS.

One of our plates in colors this month shows a residence recently completed for John McFethries, Esq., at Springfield, Mass. The underpinning and first story at tower are built of local brick laid in red mortar. The exterior framework throughout is sheathed, covered with shingles, and painted dark green, with light olive green trimmings. Roof shingled and painted red. Dimensions: Front, 44 ft. 11 in.; side, 50 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. The arrangement of the interior is excellent. It is finished handsomely in a substantial manner, and it is provided with all the best improvements. Vestibule and hall are trimmed with quartered oak. Vestibule has a floor laid with unglazed tiles. Hall has a paneled wainscoting. It contains a very handsome staircase with carved newels. This staircase is lighted by stained glass windows, and it also has a paneled divan on first landing. The doors and windows have heavy moulded casings. Parlor is trimmed with black walnut, library with cypress, and dining room with oak. The fireplaces in parlor and library are trimmed with tiles, and each have hardwood mantels elegantly carved. Dining room is wainscoted in panels, and it has a parquet floor and a buffet built in, with rare bits of carvings, etc. The other floors are laid with oak and highly polished. Butler's pantry, kitchen and laundry are trimmed and wainscoted with hard pine, finished natural. Kitchen is furnished complete. An ice box is built in, with outside entrance thereto. The second floor throughout is trimmed with cypress, and it contains a large hall, four bedrooms and bathroom. The latter is wainscoted and fitted up with the usual fixtures replete. Four bedrooms and storage on third floor. Cemented cellar contains furnace and other necessary apartments. Cost $9,750 complete. Mr. E. L. Chesebro, architect, 12 Cornell street, Springfield, Mass.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT BRIDGEPORT CONN.

One of our colored plates presented in this issue illustrates the residence of the Secretary of State, the Hon. John J. Phelan, at Bridgeport, Conn. An additional view is given on page 31. The design is a very popular one, and deservedly so. It combines a most convenient arrangement of rooms, with a very attractive exterior, and is built at a moderate cost. The underpinning is built of rockfaced bluestone. The exterior framework is sheathed, papered, clapboarded, and painted pearl-gray, with trimmings of a darker shade. Roof slated. Dimensions: Front, 37 ft. 6 in.; side, 43 ft., not including front piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The reception hall, spacious and well lighted by windows, glazed with delicate tinted glass, communicates with parlor and library by double sliding doors. The interior throughout is trimmed with whitewood. Hall, parlor and library are finished in cherry, and dining-room in oak. Hall contains an ornamental staircase. Parlor is provided with an open fireplace, furnished with a tiled hearth and a carved cherry mantel with mirrors, etc. Library has a similar fireplace, with slate mantel. Butler's closet, fitted up in the best possible manner, separates the kitchen from the rest of the house. Kitchen and pantries are trimmed and wainscoted with whitewood, finished natural. There are four bedrooms, large closets and bathroom on second floor. The front bedroom is finished in black walnut. The hall and other bedrooms are finished in cherry. Bathroom is wainscoted with yellow pine and furnished replete. The servants' staircase is a private one from cellar to third floor. One bedroom on third floor, besides ample storage. Cemented cellar contains laundry, furnace and other apartments. Cost $6,000 complete. Mr. A. H. Beers, architect, Bridgeport, Conn.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A DWELLING AT SPRINGFIELD, MASS.

Our engraving, page 35, presents a dwelling of moderate cost, recently completed for T. M. Granger, Esq., at Springfield, Mass. The design is a good model for a modern house, and it has a pleasant porch, balcony, bay window, and a well arranged plan. Dimensions: Front, 30 ft. 6 in.; side, 53 ft., inclusive of front piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. Foundation, stone. Underpinning, red brick. First and second stories, clapboards. Balcony and gables, shingles. Painted pearl-gray with darker trimmings. Roof slated. The interior throughout is trimmed with ash and finished natural. Hall is lighted by a stained glass window, and it contains a staircase of unique design. The stationary bowl under staircase is a convenience. Parlor and library are spacious and well lighted, and the former is provided with a bay window and fireplace furnished with a tiled hearth and a hardwood mantel. Dining-room is separated from kitchen by a butler's pantry, which is fitted up with bowl, drawers, cupboards, etc. Kitchen is wainscoted and furnished with the usual fixtures complete. Second floor contains four bedrooms, den and bathroom. Bathroom is wainscoted. Three bedrooms and trunk room on third floor. Cemented cellar contains laundry, furnace and other apartments. Cost $4,000 complete. Messrs. Granger & Morse, architects, Springfield, Mass.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A DWELLING NEAR BRIGHTON, MASS.

On page 34 will be found an engraving of a dwelling, recently completed, near Brighton, Mass., for D. H. McKay, Esq. The design is a mixture of Colonial and Queen Anne architecture, and it presents a good model for an American cottage. The materials are of the best quality, and are put together in a thorough workmanlike manner. The underpinning is built of rockfaced stone, laid up and neatly pointed. The exterior framework is sheathed, covered with shingles, and stained sienna with white trimmings, and bottle-green blinds. Roof shingled and stained similar. Dimensions: Front, 23 ft. 6 in.; side, 35 ft. 6 in, not including front piazza and rear porch. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft.; third, 8 ft. The plan is excellent, and it contains a spacious hall, which has direct communication with all the apartments. This hall, and the interior throughout, is trimmed with whitewood, and it contains an ornamental staircase turned out of similar wood, and lighted by a stained glass window. The parlor is treated in ivory-white, and it has an open fireplace furnished with a tiled hearth and facings, and a Colonial mantel with columns, etc. The trim in dining-room and elsewhere is finished natural. Butler's pantry and kitchen are wainscoted and fitted up with the usual fixtures complete. The second floor contains four bedrooms, large closets and bathroom, and the third floor contains one bedroom, besides ample storage. Bathroom is wainscoted and provided with tub, bowl and closet. Cemented cellar contains furnace and other apartments. Cost $2,800 complete. Mr. Austin W. Pease, architect.

Our engravings were made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT GREENWICH, CONN.

On pages 38 and 39 will be found engravings and floor plans of a residence, erected for Nelson B. Mead, Esq., at Greenwich, Conn. The design presents a beautiful example of Colonial architecture. The first story, porte-cochere, and chimneys are built of huge boulders laid u at random. Second story is built of wood, and th exterior is sheathed, shingled and left to weather finish Blinds painted bottle-green. Roof shingled. Dimensions: Front, 67 ft. 6 in.; side, 39 ft. 6 in., not including porte-cochere. Height of ceilings: Cellar, 8 ft., first story, 10 ft.; second, 9 ft.; third, 8 ft. The basement, or cellar, contains kitchen, laundry, pantries, furnace, and other necessary apartments, furnished in the best possible manner, with all the improvements. The interior throughout is handsomely trimmed with whitewood. The walls and ceilings to hall, of unusual dimensions, are wainscoted and elaborately paneled. The broad, low staircase and the paneled divan are the features of hall, while the old casement window and seat make the dining-room in keeping with the several spindle transoms, and beaded windows carry out the antique effect so successfully wrought. Drawing room, spacious and well lighted, is treated in ivory-white, and it contains an open fireplace, furnished with tiles and a Colonial mantel with columns, etc. The transoms over windows are glazed with stained glass. Library and dining-room have fireplaces, built of Philadelphia pressed brick, with brick tile hearths and hardwood mantels. Butler's pantry is fitted up with staircase, dumbwaiter, bowl, drawers, shelves and cupboards in the best possible manner. The second floor contains six large bedrooms and bathroom. The bedrooms are provided with large, well fitted up closets. Bathroom is wainscoted and provided with the usual fixtures complete. The third floor contains guest's room, two servant bedrooms, besides ample storage. Mr. Wilbur S. Knowles, architect, New York.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

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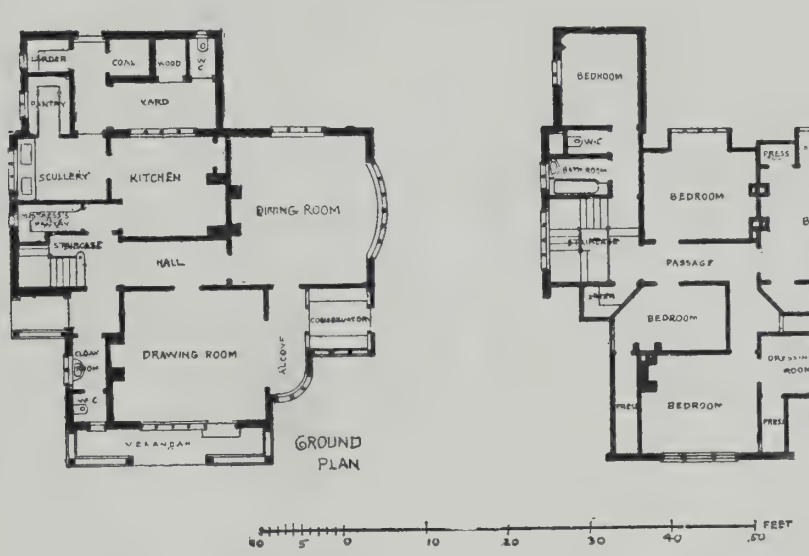
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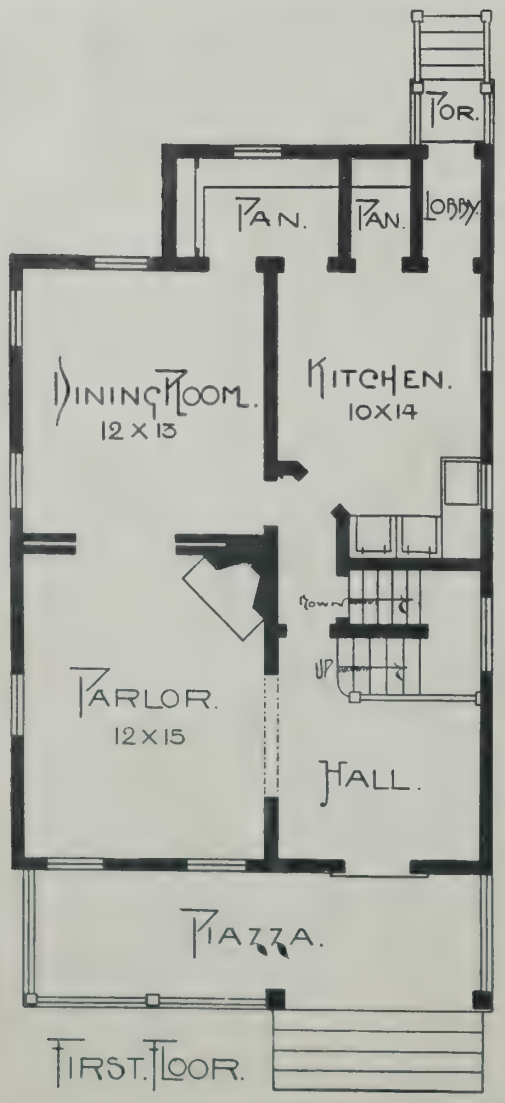


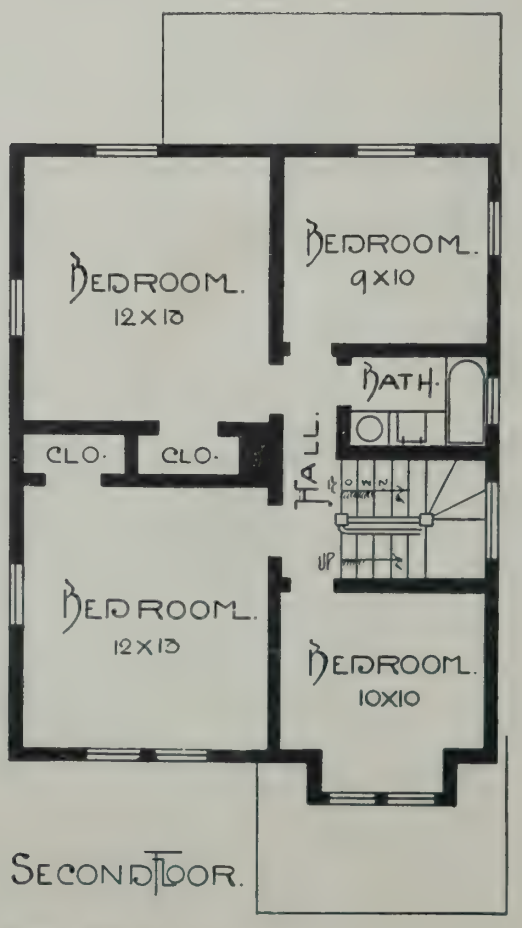




AN ENGLISH COTTAGE.—F. E. WARD, ARCHITECT.—See Page 42.



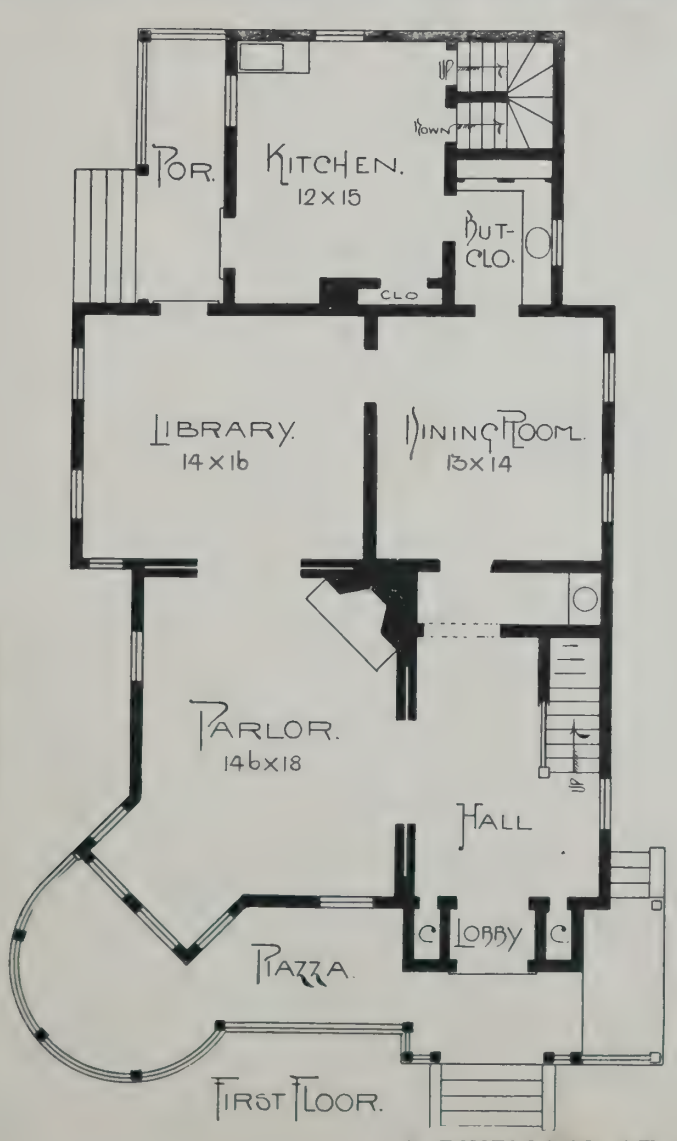




A DWELLING NEAR BRIGHTON, MASS.—See Page 32.

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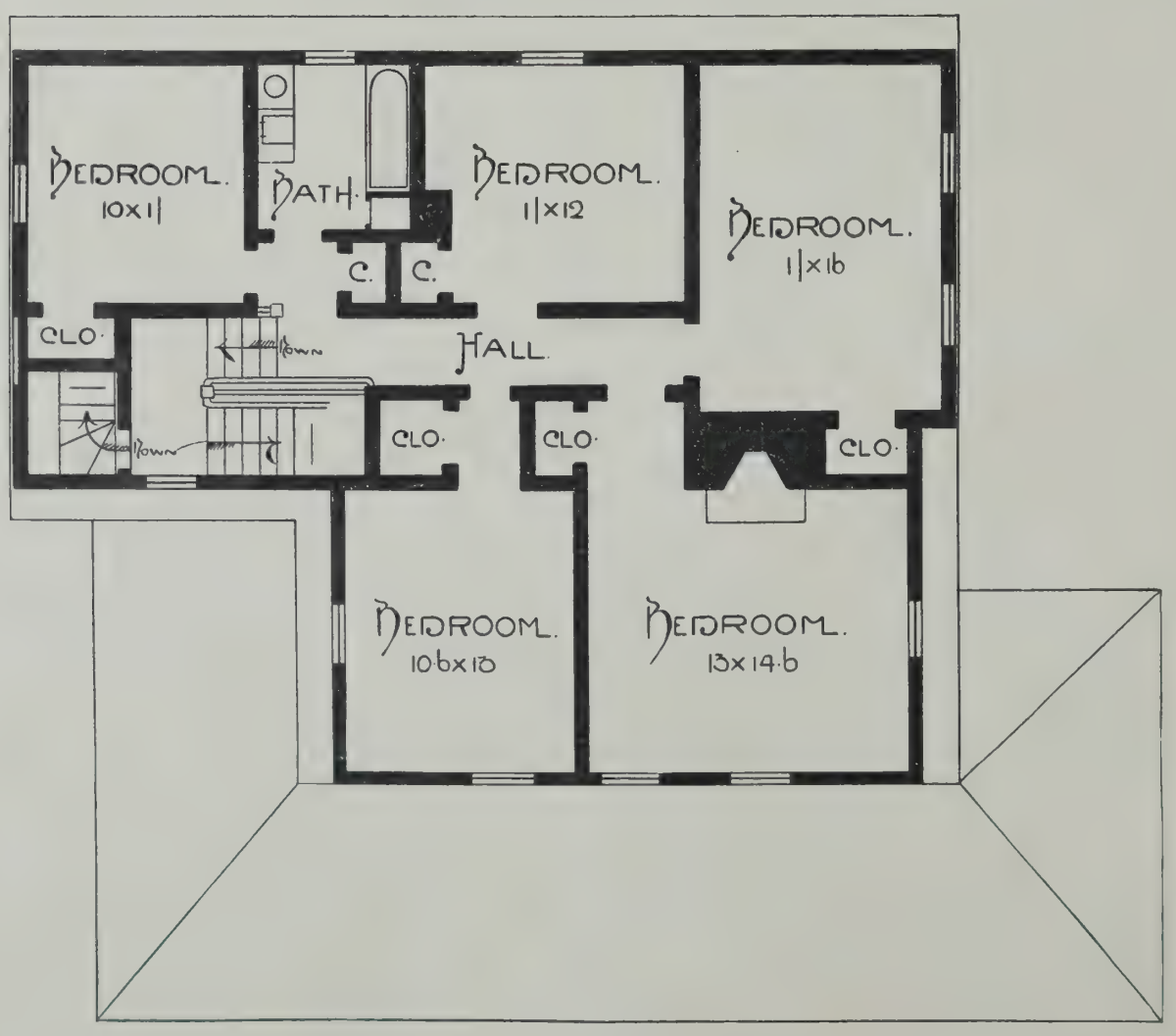




A DWELLING AT SPRINGFIELD, MASS.—See Page 32.

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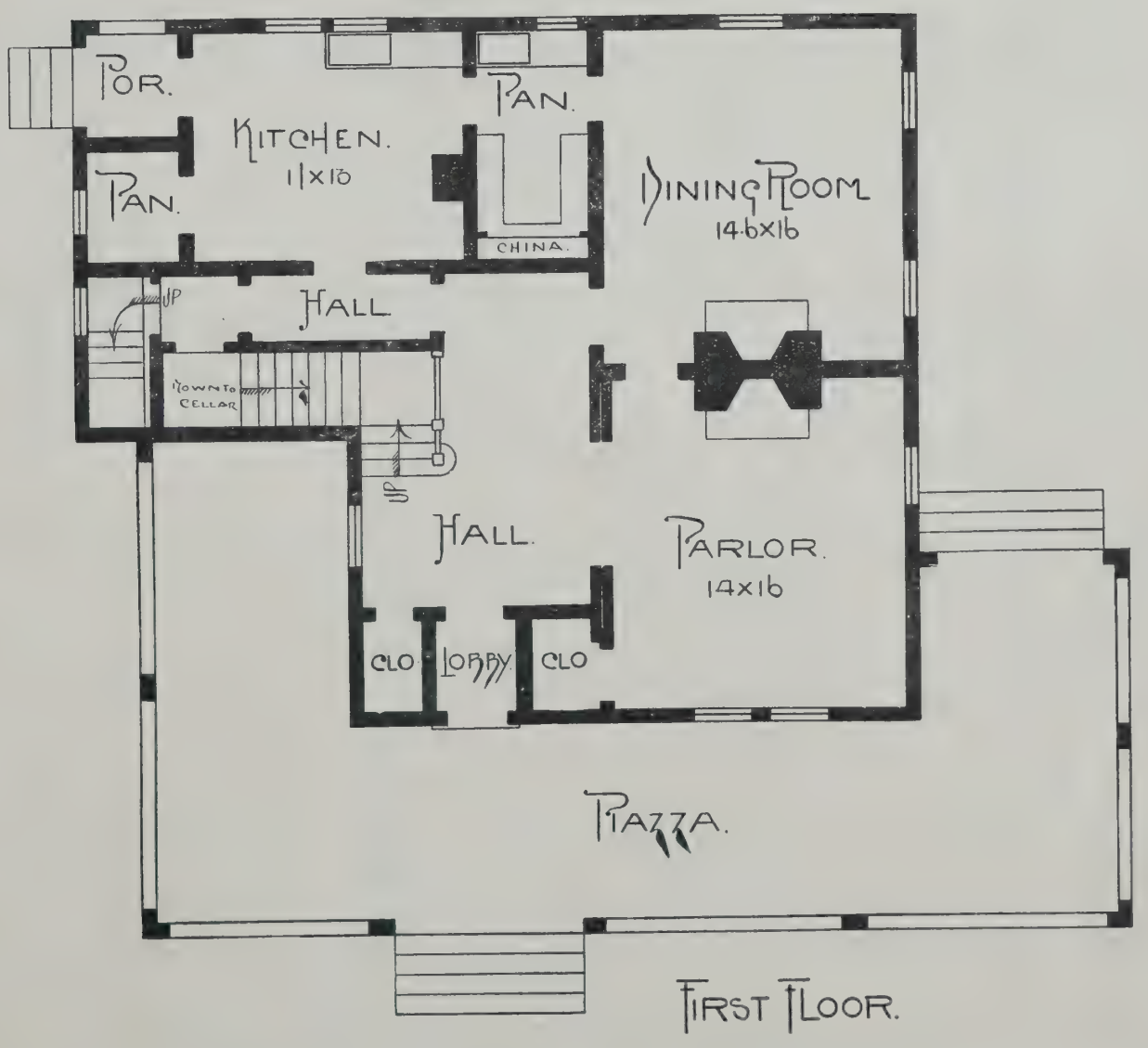


SECOND FLOOR.

A DWELLING AT BROOKLINE HILLS, MASS.—See Page 42.

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A DWELLING AT BROOKLINE HILLS, MASS.—See Page 42.

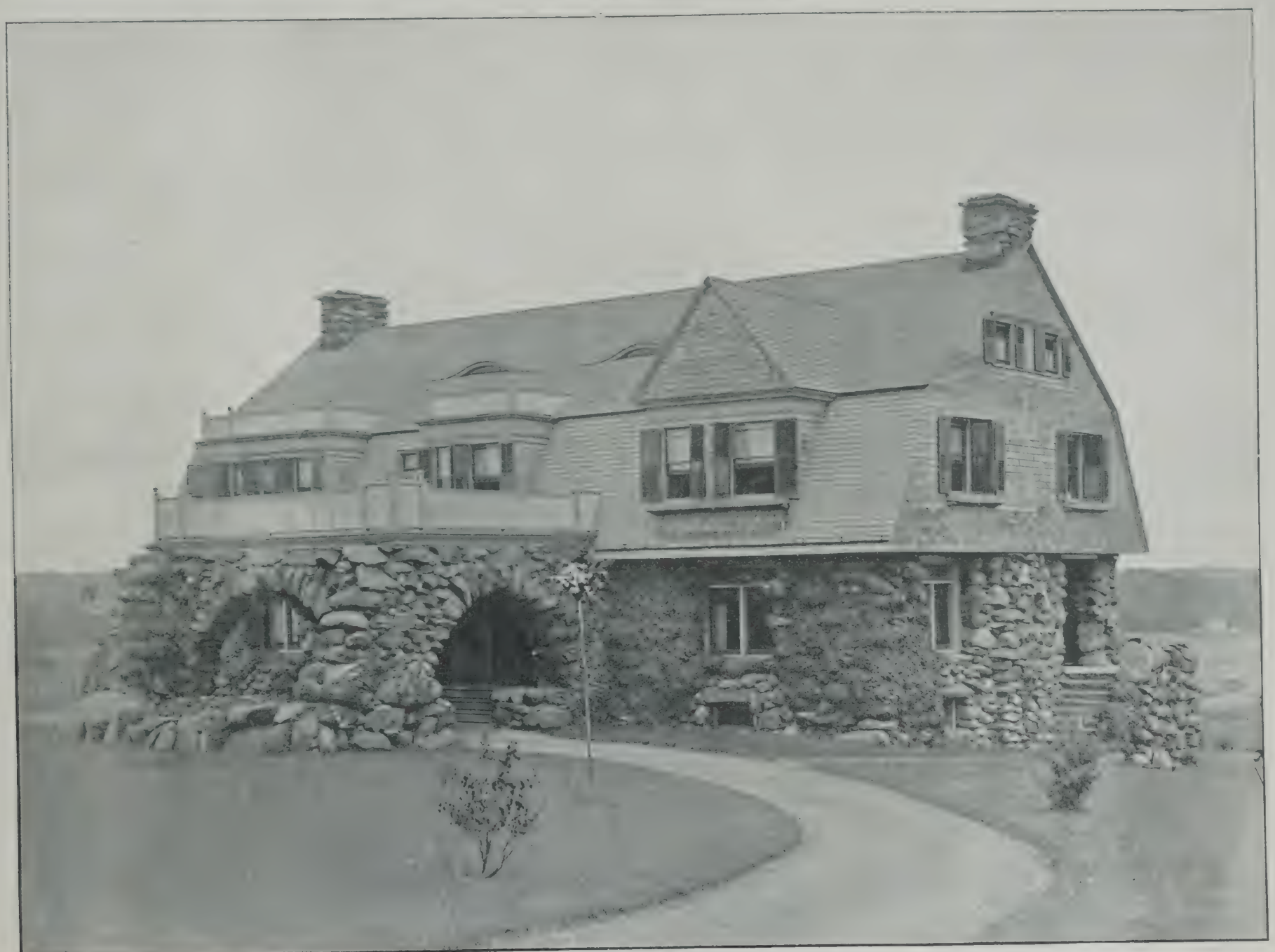
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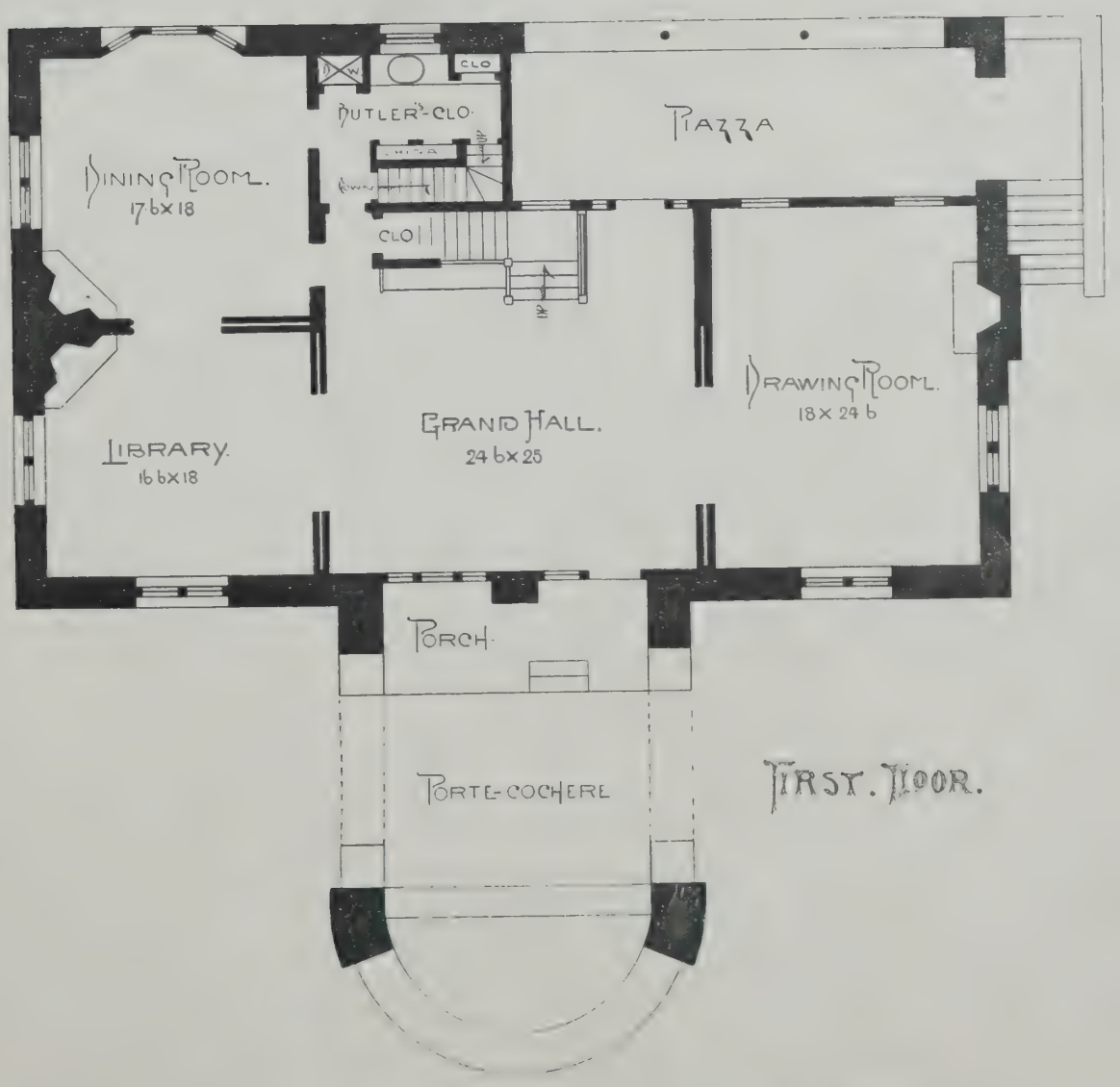




A RESIDENCE AT GREENWICH, CONN.—See Page 32.

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A RESIDENCE AT GREENWICH, CONN.—See Page 32.

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The Fifth Avenue Theatre,

NEW YORK CITY.

HENRY M. STEVENS.

This splendid example of modern architecture is located near the junction of Broadway and Twenty-eighth street, one of the choicest locations and most valuable properties in the great city of New York, and within a few steps of the famous avenue from which the remarkable edifice takes its name. The property belongs to the heirs of the late Peter Gilsey, who determined to spare no pains or expense to erect a structure at once solid, enduring and perfect in all its details. In carrying out their plans they were so fortunate as to secure the professional services of Mr. Francis H. Kimball, of New York City, than whom no one ranks higher among American architects.

Before proceeding to a detailed description of the new theatre, a few words by way of biographical sketching may not be out of place.

Francis H. Kimball is a native of Kennebunk, Me., where he was born September 23, 1845.

Kennebunkport, the centre of a brisk shipbuilding trade, was but a few miles away, and his favorite resort in boyhood. Such nautical influences had, naturally enough, their effect in inducing him to risk an early experience of the sea.

Before this event, he had received the rudiments of his education at the public schools of Kennebunk, and had entered, at the age of fourteen, the office of his brother-in-law, J. M. Littlefield, a large builder in Haverhill, Mass., where he studied and made plans for two years, gaining a practical insight into the intricacies of building construction.

It was when the first gun fired from Fort Sumter had startled the whole country into a sense of the actual beginning of the hostilities of the Civil War, that the adventurous spirit revived within him which had been fostered by the old days upon the docks at Kennebunkport. He at first thought of enlisting in the land service, but the opposition of his family compelled him to abandon that idea. It was a kind fate which led him to be thus persuaded. The 35th Mass. Regiment, with which he had decided to share the chances of war, if he could arrange to go at all hazards, was, in a month's time after its organization, engaged in the battle of Antietam, and about half the company that had been recruited from Haverhill, from which place he would have enlisted, were either killed or wounded. He succeeded finally in arranging to enlist in the United States Navy, paternal authority at last acquiescing, and went to serve before the mast, on board "The Midnight," of the South Atlantic Squadron. "The Midnight," originally known in the merchant service as "The Dawn," was a clipper ship, and had attained distinction by making the shortest time then known between New York and Rio Janeiro.

The young mariner was but a fortnight aboard ship before he was master of all the details of a sailor's daily routine—he knew every rope upon the vessel.

It was not long before this ready adaptation of personal ability to the occupation in hand attracted the attention of those in command, and established for him a popularity which lasted during the entire eighteen months of his service in the navy.

At the end of the year and a half, comprehending his period at sea, he returned to Haverhill, then of about fifteen thousand in population, and a flourishing centre for the shoe industry, and resumed his studies as a student of architecture, which had evidently the most attraction for him.

After two years spent in Haverhill, he sought fresh experience in Boston, in the employ of the well-known firm of architects, Gridley J. F. Bryant and Louis P. Rogers. Eighteen months of assiduity there rewarded him with a mission to Hartford, Conn., to make plans, and take charge of the construction of the Charter Oak and Connecticut Mutual Life Insurance Buildings, where he remained four years in the execution of that contract, having entire charge of the firm's business during this interval. He had entered their service at twenty.

At twenty-four, Jas. G. Batterson, president of the Travellers' Insurance Company of Hartford, engaged him to prepare competitive drawings for the State Capitol at Hartford, which work he immediately assumed. On the final settlement of the Capitol question in favor of Hartford, land was purchased of Trinity College by the State, and the College bought a large tract in the western part of the city.

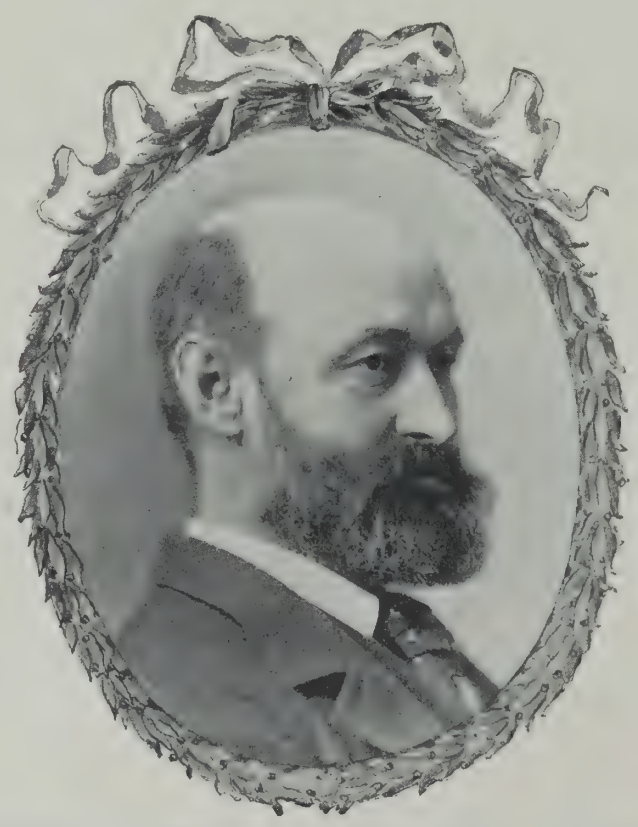
A noted English architect, William Burges, was consulted in reference to plans, and, it being necessary to have a local superintendent, Mr. Kimball was appointed by the college to fill that office. In order that he should be entirely familiar with the ideas of Burges, he was sent to London. The plan embraced a number of buildings—a university, in fact—and as the drawings had to be prepared in advance, he remained almost a year in the office of the English architect. Mr. Kimball's close relations with Mr. Burges admitted him not only to all the advantages of that distinguished architect's practice—a training which could not be acquired in the general course of study in the ordinary way—but to the social privileges of a man of Mr. Burges's professional rank in London.

Through this connection, the young American was enabled to meet such men as Sir Gilbert Scott, Horace Jones, city architect, Albert Waterhouse, and J. L. Pearson.

He returned to America, and the necessary buildings for the use of the college were then erected under his supervision. His engagement with the college lasted five years. During this period he also built, in addition to several other prominent structures, the Hartford Orphan Asylum. The style of the college buildings was thirteenth century French Gothic, and, had the buildings been completed upon the scale originally conceived, no more flattering monument to an architect's ability and skill could be offered to posterity.

1879 proved to be the beginning of a new departure in theatrical architecture in New York. A new theatre was about to rise from the ashes of the little house in West 24th street, just off of Broadway, wherein Augustin Daly had entertained with such success his select audiences for a considerable time. The Fifth Avenue people had lost their Fifth Avenue Theatre by fire. Mr. Kimball was invited to make plans for a new structure, which was to be called "The Madison Square Theatre."

Settling in New York, he proceeded to put into operation a system of theatrical construction and of interior decoration which, on the completion of the building, made it the talk as well as the admiration of the whole city. He associated with himself in practice Thomas Wisedell, the partnership continuing until the latter's death in 1884. With the exception of a limited association with Henry S. Ihnen in 1886, he continued alone until his recent connection with Mr. George Kramer Thompson.



FRANCIS H. KIMBALL, ARCHITECT, NEW YORK CITY.

Since his residence here, he has erected under his own personal supervision a number of our most prominent and substantial buildings and warehouses, among them being the Casino, Harrigan's Theatre, the Montauk Club's palatial home in Brooklyn, and many handsome residences in both cities. He has also made the plans for several theatres and buildings outside of New York, the new theatre at Middletown, Conn., being a recent example, and, with Mr. Wisedell, furnished the full details for the great terrace around the Capitol at Washington.

He has designed a number of picturesque stations for the Philadelphia & Reading Railroad, and is the associate architect on the new Terminal Building now being erected by that road in Philadelphia. With Mr. Thompson he was successful in the recent competition for the Manhattan Life Insurance Company's building, to be erected adjoining the Consolidated Stock and Petroleum Exchange, on lower Broadway. This was a special triumph, and yielded to both considerable satisfaction, as they were pitted against nine of the leading architects of the city. The building in question is intended to be the highest in New York.

His last example, the new "Fifth Avenue Theatre," is, of course, now of the greatest interest, being but only lately completed, and coming, as it does, fresh from his careful and conscientious supervision.

It is in the style of the Italian Renaissance.

In the expression of the delicately treated manner of revived Classic Art, its architect has been singularly fortunate in all the details of the building.

The Renaissance, essentially a Latin movement, primarily asserting itself in Italy and France, and felicitously indicating the artistic inclinations of those two nations, has, within a very short period, readily adapted itself to our own requirements, responding, as architecture has done in every country where it has flourished successfully, to the demands of its environment.

In the work of laying the foundations serious perplexities were encountered at the outset, consisting of the rise of water in the trenches, and the necessity of carrying the foundations down below those of the adjoining buildings. This was accomplished by the architect, who caused a series of steel caissons to be sunk, which were carried down through the water and earth to the solid rock, a distance of about twenty-five feet below the sidewalk. The caissons were then cleared, and within them masonry piers were built up.

A heavy granite cap was placed on each pier, then a line of girders formed of steel beams, running the entire length of the west wall, nearly 100 feet, were placed in position, and on these the brickwork of the wall was started.

By this means, the foundations of the adjoining building were not disturbed, and the earth under them remained intact.

The Ironwork.—The ironwork of the theatre was furnished by the Riverside Bridge and Iron Works. A portion of the main walls is carried on girders below the cellar floor, resting on the circular iron caissons, four feet in diameter, and which are filled in with brickwork as before described.

The balcony and gallery brackets are made in one piece, resting on horizontal girders, giving great rigidity. The roof is built in the form of a dome, of steel riveted trusses, held together in the centre by a wrought steel compression ring.

On top of these trusses are placed iron purlines, supporting terra cotta filling blocks, making the roof fireproof. One side of the roof frame is carried by a riveted girder, nine feet deep and seventy feet long. The proscenium girder is built entirely of steel, is fifty-one feet long, and weighs fifteen tons.

One of the features of the theatre, as has been mentioned, is the Broadway entrance, where a fireproof corridor is constructed through an old building. To support one side of this corridor, a steel truss is placed, twelve feet high and seventy feet long.

To the skill of Mr. Charles O. Browne, President of the Riverside Bridge and Iron Works, the successful execution of all the difficult problems of the iron and steel construction of the building is due.

Born and educated in Germany, and beginning his career as civil engineer in this country in 1872, Mr. Browne established, twelve years ago, the Riverside Bridge and Iron Works on a small scale, the property at that time covering only eight city lots.

The works were subsequently extended, and now include the block bounded by Lyon, East Fifth, Putnam and Wait streets, at Paterson, N. J. They occupy twenty-nine city lots, adjoin the Erie Railroad, and have a switch running into them, which last feature enables them to manufacture very large girders and other pieces of ironwork, that are placed directly upon the cars of the railroad when ready for shipment.

Owing to the long experience and the practical engineering knowledge of Mr. Browne, the manager and head of the company, it has been constantly improving, particularly in the construction of fireproof buildings in New York city, and has consequently been instrumental in changing the style of construction during the last ten years or so.

While, before that time, a girder thirty feet long was considered a heavy piece of iron to put into a building, the introduction of girders 100 feet long, made, shipped and erected in one piece, is at present not at all extraordinary. A large number of iron structures have been erected in this city and Brooklyn by the company, whose field of labor is not restricted to the United States, however, but is creditably connected with the erection of many bridges, telegraph towers, piers, etc., in South America. The average number of hands in the works and outside is 200, the works themselves turning out 20,000,000 pounds of manufactured iron per year.

The company manufactures not only railway and highway bridges, but also structural and ornamental ironwork of all descriptions for buildings, iron awnings, balconies, beams, capitals, columns, cornices, domes, doors, fire-escapes, front girders, lintels, patent lights, roofs, railings, rolling and folding shutters, sidewalk elevators, sills, skylights, stairs, stoops, window guards, etc.

Among the important buildings and bridges it has made are the following:

Buildings.—Liverpool, London and Globe Building, Newark, N. J.; Zinsser Buildings in Washington, Beach

(*Continued on page 42.*)



THE FIFTH AVENUE THEATRE, BROADWAY AND TWENTY-EIGHTH STREET, NEW YORK.
FRANCIS H. KIMBALL, ARCHITECT.

THE FIFTH AVENUE THEATRE, NEW YORK CITY.—Cont'd.

and William streets, New York; Arion Building, New York; Erie Railroad Ferry Shed, Jersey City; Smith, Gray & Co.'s Building, Brooklyn; Manhattan Storage Warehouse, 42d street and Lexington avenue; Grand Stand, Club House and Saddling Paddocks, Morris Park; Freight Sheds for the Pacific Mail Steamship Co., at Aspinwall; Passenger Stations Panama Railroad, at Colon and Panama; St. Francis Xavier's College, 16th street and Sixth avenue, New York City; Union League Club, Brooklyn; Gate Houses on Croton Aqueduct, and Store Building for Wechsler Bros., Fulton street, Brooklyn.

BRIDGES.—The new iron bridges for the Rochester Division and Jefferson Branch of the N. Y., L. E. & W. R. R.; Hackensack Draw, Erie R. R.; Passaic Falls, Clay street Bridge, Newark, N. J.; Float Bridges, Piers 7 and 8, Long Dock, Jersey City; Float Bridge, Lehigh Valley; Float Bridge for the Standard Oil Co.; Chicama Bridge; Chagres Bridge, Panama; 33d street, Ellison street and Lyon street Bridges, Paterson, N. J.; and also many highway bridges in New York, New Jersey and elsewhere.

(To be continued.)

Paving Estimates.

Estimates per square yard for the different kinds of paving for Pacific Avenue, in Tacoma, are as follows:

WOOD.

Size of blocks, nine inches long, three inches wide, and six inches deep. If concrete is used for foundation, it would be six inches thick, and in the proportion of one part of cement to four parts of sand and six parts broken rock. Estimate for one square yard of wood blocks:

Concrete, six inches thick, at $9 per cubic yard	$1.50
Sand, one inch thick, at $1 per cubic yard	03
Six inch block, fifty-four feet B. M., at $10 per M	54
Labor, 2 cents per square foot	18
Total cost	$2.25

BRICK ON CONCRETE, PER SQUARE YARD.

Concrete, six inches thick, at $9 per cubic yard	$1.50
Sand, one inch thick, at $1	03
Brick on edge (8x5x4), eighty-one brick per square yard, at $14	1.13
Labor, 2 cents per square foot	18
Total cost	$2.84

DOUBLE BRICK PAVEMENT, PER SQUARE YARD.

Gravel, eight inches thick, at $1 per cubic yard	$0.22
Brick, laid flat, forty-one brick, at $14	57
Sand, two inches thick, at $1 per cubic yard	06
Brick on edge, eighty-one brick, at $14	1.13
Labor, per square yard	25
Total cost	$2.23

BITUMINOUS ROCK.

Concrete	$1.54
Bitumen laid in place	1.20
Total cost	$2.74

World's Fair Items.

Two immense search lights, which will be used to illumine the grounds next summer, have arrived at Chicago, and will probably be used for the dedicatory exercises. These great lamps weigh respectively 2,200 and 1,300 pounds, with diameters of 4 and 3 feet. The larger one will be placed on the roof of the Manufactures Building, and will, it is said, light up the Van Buren Street station, seven miles away, with the intervening space. The other will be mounted on the cupola of the Transportation Building, and will shed light on the Illinois Central tracks, to the south and west. A six foot lamp is to be put up next summer. These search lights are the largest in the world.

The fourteen principal buildings and their cost are:

Transportation Building, 5 3-5 acres	$370,000
Horticultural Building, 5 7-10 acres	325,000
Mining Building, 5 2-5 acres	265,000
Electricity Building, 5 1-2 acres	401,000
Machinery Hall, 9 3-5 acres	1,285,000
Administration Building, 1 3-5 acres	435,000
Agricultural Building, 9 1-5 acres	618,000
Manufactures Building, 30 1-2 acres	1,500,000
Government Building, 3 3-10 acres	400,000
Fisheries Building, 1 2-5 acres	224,000
Battleship, 1-3 acre	100,000
Art Building, 4 4-5 acres	670,000
Forestry Building, 2 1-2 acres	100,000
Women's Building, 1 4-5 acres	138,000
Total	$6,831,000

The Finance Committee have decided to recommend that $150,000 be appropriated to construct a special building for educational exhibits. It will afford 160,000 square feet of space and be located east of the Fine Arts Building. This will relieve the tremendous pressure for space in the Manufactures Building, to which the liberal arts display was previously assigned.

Canada will exhibit a mammoth cheese made at the Dominion experimental station at Perth. It weighs over 22,000 pounds, and contains the curd of a day's milk from 10,000 cows. A gigantic oaken press was erected for the purpose of constructing the cheese, and 200 tons of pressure was applied. The cheese has already been pronounced perfect in texture, flavor, and color. It will be placed in the pyramid of Canadian dairy products at the World's Fair, and will afterward be cut up and sold in pound blocks, either in Chicago or in Great Britain.

Plans and Specifications.

Full plans and specifications complete, ready for the builder, may be obtained at this office, for any of the structures illustrated in this publication. We also prepare plans for buildings of every description, including dwellings, churches, schools, stores, barns, carriage houses, etc. Our work extends to all parts of the country. We are assisted by able architects. Terms moderate. MUNN & Co., 361 Broadway, New York.

A DWELLING AT BROOKLINE HILLS, MASS.

Our engravings, pages 36 and 37, illustrate a dwelling, recently erected for Geo. A. Goddard, Esq., at Brookline Hills, Mass. The principal feature of this house is the spacious piazza, which extends across the front and returns at either side. The underpinning is built of local bluestone; the building above being sheathed, covered with shingles and stained sienna. Roof shingled and painted red. Dimensions: Front, 39 ft. 6 in.; side, 33 ft. 6 in., not including front piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in. Cemented cellar contains laundry, furnace and other necessary apartments. Hall and dining-room are trimmed with oak; the former contains a very handsome staircase turned out of similar wood. The other apartments are trimmed with whitewood and finished natural, with the exception of parlor, which is treated in ivory-white. The fireplaces are built of red brick, with hearths laid of same, and they are provided with mantels of excellent design. Kitchen and pantries are wainscoted and furnished with the usual fixtures in the best possible manner. There are five bedrooms and bathroom on second floor. Bathroom is wainscoted and furnished replete. Ample storage is provided in attic. Cost $5,300, including furnace and everything complete. Messrs. Shepley, Rutan & Coolidge, architects, Ames Building, Boston, Mass.

Our engravings were made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.



THREE COTTAGES IN ONE.

THREE COTTAGES IN ONE.

We give a sketch, by T. W. Cutler, architect, of a tasteful design for a three family cottage, for which we are indebted to the *British Architect*. This cottage might be erected hereabouts for about $4,500, if finished in plain style. In some parts of the country it could be put up for considerably less than the above estimate.

Painting the World's Fair Buildings.

The painting and decorating of the vast interiors of the great exhibition halls at Chicago is an enormous undertaking. Frank Millet is the artist in charge. A recent estimate of the area to be covered with paint developed the fact that it would be impossible to set enough men at work with brushes to complete the task in time for the opening of the fair. Mr. Millet thereupon contrived a machine for doing the work. It consists of a piece of gas pipe flattened at one end to make a "spray." From this a rubber hose connects with an air pump driven by an electric motor, and beyond this is a barrel of paint. The pump sucks paint from the barrel, and the air jet sprays the paint with force upon the surface to be coated. Four workmen with this mechanism can accomplish more in a day than a small army of painters could in a week.

AN ENGLISH COTTAGE.

We give on page 33 plans and elevations of an English cottage, for which we are indebted to the *British Architect*. The design is quaint, and presents several pleasing features.

DRAWING INSTRUMENTS FOR COLLEGES, ETC.

College officials, desiring to furnish their students with instruments made in the best patterns and from the best materials, are invited to correspond with the firm of Ball-Ball Co., Ltd., Frankford, Philadelphia, Pa. One of the results of the increased attention which has been given during the last few years by the colleges to establishing drawing rooms, is the demand for *good* drawing instruments. This company make only the highest class instru-



ments. Their compasses and dividers are made out of German silver, high grade nickel, and the best imported steel, the patterns being of the best and most approved styles. This company have a patented Duplex Pen that



can be set to make two lines of different sizes. These lines are regulated, each one separately, by set screws, exactly the same as an ordinary ruling pen. The second line is made by pressing a lever that opens the pen as far as the set screw will allow. In this way two lines of different widths can be made, each one separately. This pen fills the requirements of two pens in one, and has the advantage of keeping the ink fresh by the motion of the lever. An illustrated catalogue sent upon application.

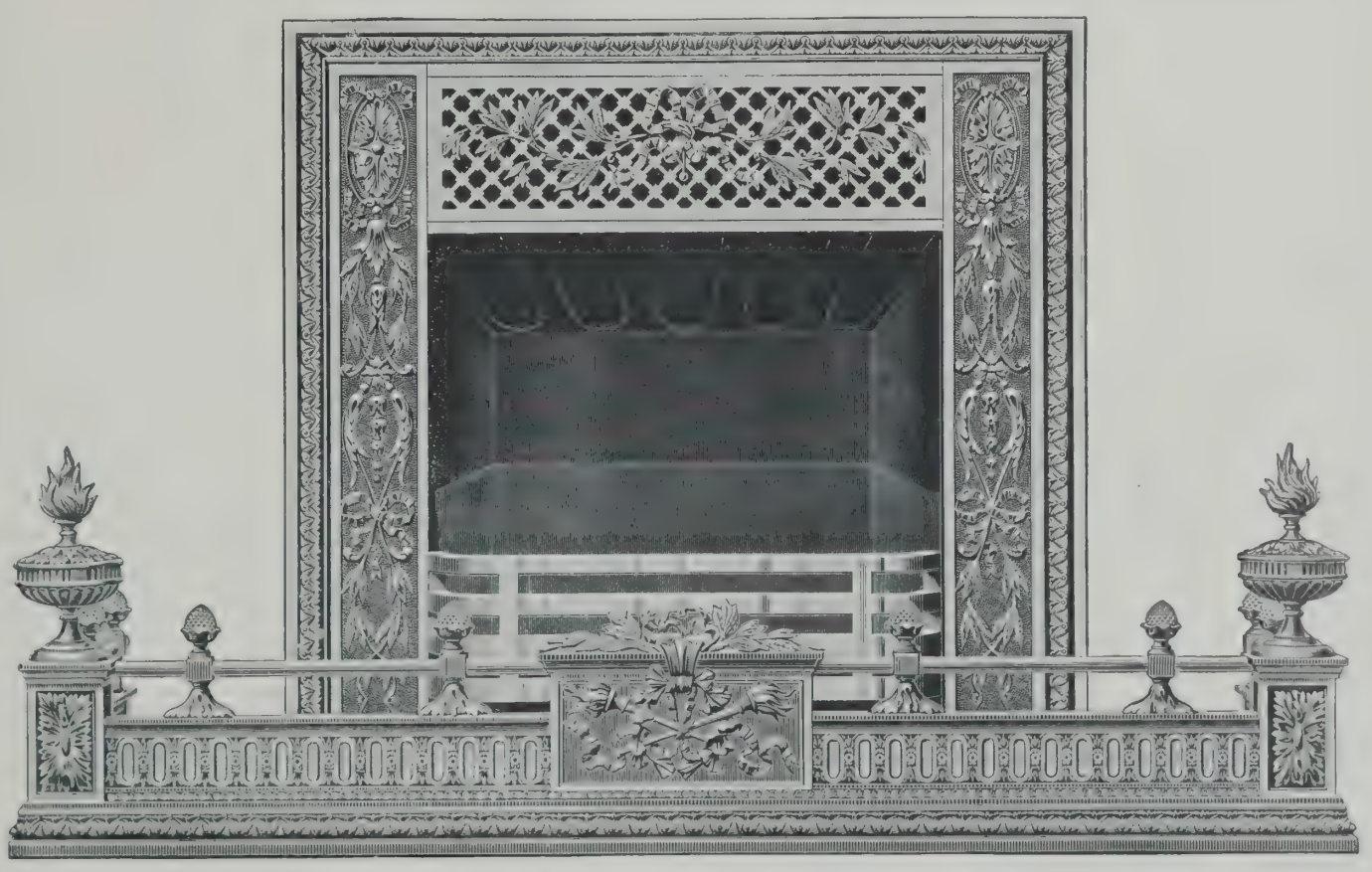
MESSRS. F. S. HUTCHINSON & COMPANY, of Long Island City, N. Y., manufacturers of the Paragon Self-Retaining Dumb Waiters, give in their advertisement the names of a long list of centrally located firms handling their goods. Their factory is most conveniently located for the manufacture of these waiters, as respects the obtaining of the material and making shipments at low cost. The waiter is strong and simple in operation, and automatically holds the load at any point, even when loaded to its full capacity.

A TASTEFUL FIREPLACE DESIGN.

For warmth and ventilation, for cheer and decoration, the open fire is a most important feature of the living rooms, and yet it is often forgotten in building. A residence may be in pure style, and the rooms decorated in keeping, but the architect and owner frequently will not think of having the fireplaces in corresponding style. On this account Messrs. Edwin A. Jackson & Bro., of New York City, have secured many designs to suit different styles of decoration, which have been highly commended by the most eminent architects. In the accompanying illustration we show one of their designs for a Louis XVI. parlor or reception hall.

Aside from the artistic value of a fireplace is the more practical one of heating. With the usual construction, this is generally estimated at nil, as seven-eighths of the fuel passes up the chimney, or is lost through the back of the fireplace. Realizing this, the firm have invented the Jackson Ventilating Grate, which, by saving the heat usually lost, makes their fireplace one of the most economical of all good systems of heating. By means of an air chamber around the back and sides of the grate, pure air is brought in from outdoors, is heated by the heat usually wasted, and made to warm other rooms on the same or different floors. In the latter case, the hot air chamber, by means of a pipe, is connected with a register on the floors above, thus combining the heating power of the furnace with the ventilating power of the open fire.

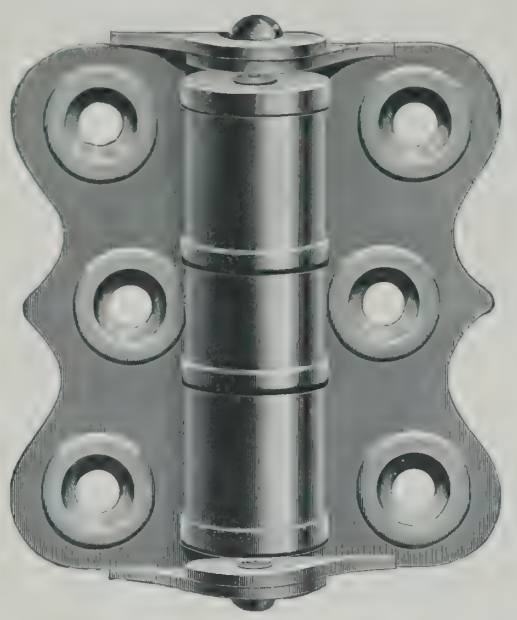
Their Catalogue F shows the working of their ventilating grates. Illustrated catalogues will be cheerfully sent on application.



A LOUIS XVI. FIREPLACE DESIGN FOR PARLOR OR HALL.

AN IMPROVED STEEL SPRING HINGE.

The Stover Manufacturing Company, of Freeport, Ill., is introducing a steel spring hinge, shown in the illustration, which is both light and strong, and is covered to protect it from the weather and preserve the life of the



THE NEW IDEA SPRING HINGE.

spring. It holds the door strongest at the closing point, the resistance gradually decreasing in opening and increasing in closing. It reverses at about 130 degrees and holds the door open, working perfectly free and without cramping or binding.

Vegetable Growth in Water Mains.

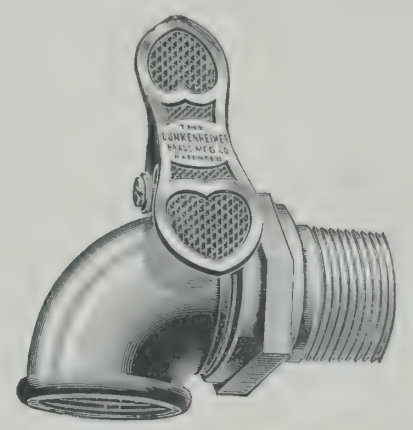
A vegetable growth in the water mains at St. Paul, Minn., has lately, according to the *Engineering Record* been the cause of some trouble. The first case was discovered by the superintendent, in one of two service pipes in a single trench supplying a double house. A complaint was made of bad water, which flushing failed to improve. One of the pipes delivered pure water, and one supplied a muddy liquid that was of no use. This fact led to the conclusion that one of the services was foul; and the remedy applied on this supposition proved effective. The boiler of a portable engine was connected with the faucet of the kitchen sink from which the muddy water came, and a steam pressure of 70 pounds forced against the 35 pounds water pressure for 30 minutes—thereby driving the water out of the pipe. Since that time the pipe has always delivered clear water, and twelve similar cases have been successfully treated in the same manner. Great care has to be taken that there are no leaks in the service pipes, and that none of the fittings is open during the steaming.

American Machinery in London.

A machinist employed by Mr. Andrew J. Corcoran, the windmill manufacturer, of 76 John Street, New York, recently sailed for England, to set up in London a complete duplicate of Mr. Corcoran's wood working machinery, for the manufacture of wooden tanks, which are used to contain water for other purposes, for the Chippingdale Company (limited), of London. The company has merged under one head all the leading cooperage concerns in and about London, and recently has developed a desire to adopt the Corcoran system of water supply for country residences. A number of mills have been sent to London, and Mr. Corcoran has a number of orders for others. The mills and pumps will still be made in this country, but the lumber for the tanks will be sent to London from the South.

A FOOT RADIATOR VALVE FOR HOT WATER RADIATORS.

The valve shown in the illustration has been designed by the Lunkenheimer Company, of Cincinnati, to meet the want for a first-class and convenient hot water radiator valve. It is compact and simple in construction,



A FOOT RADIATOR VALVE FOR HOT WATER RADIATORS.

ornamental and inexpensive. It is provided with a foot-piece, whereby the flow of hot water is completely under control, and the valve can be opened to any degree, the foot-piece acting as an indicator. This valve is provided with an improved non-leakable stuffing box.

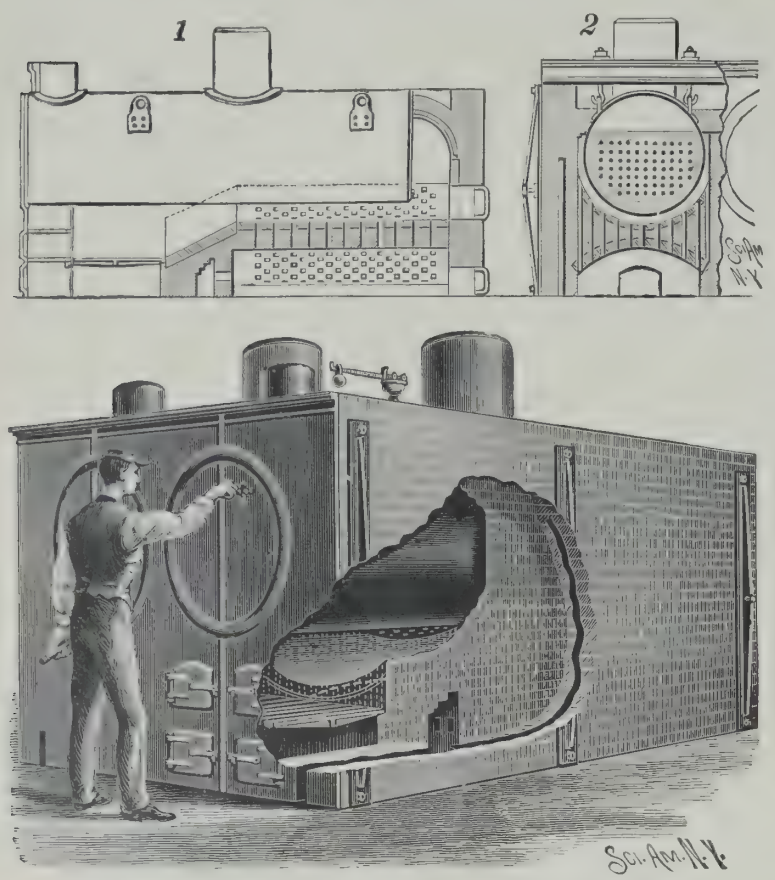
New Tinplate Plant.

Gummey, Spering & Co., of Philadelphia, have recently erected a new tinplate factory in that city, at Twenty-sixth Street and Washington Avenue, where they are now turning out a weekly production of 350 boxes of 20 x 28 American roofing plates of the highest grade. The establishment includes a tinning shop containing two Welsh tinning machines, a sorting and packing house, and a smelting department. The black sheets used are best quality Siemens steel plates. The plates are treated with the palm oil process, and one pot is used for operating the bright surface sheets. The Company's brands of "Climax" and "Phœnix" terne plates are especially recommended to architects. The tin used is procured mainly from Australia and Eastern Asia, and is of the most select quality.

The smelting department contains a large melting pot, with a capacity of 12,000 pounds, for making stereotype, electrotype, and Babbitt metals, also two solder furnaces capable of melting 26,000 pounds of metal a day. The latter are so arranged that by means of a circulating draught round the pots a uniform heat is always secured for all parts of the mixture. A considerable quantity of solder and other metals is produced here, a portion of which is retained for home use. In connection with the smelting department we are informed that Messrs. Gummey, Spering & Co. have in use a very interesting and delicate machine for ascertaining the exact proportions of lead and tin in any sample of solder. The metal required to be tested is run into a mould which forms a conical bullet. The piece of metal is placed on a scale, the beam of which is divided into spaces of 100°. Should the sample be pure lead, the pointer will mark 100; but if not of pure tin, it will not leave the 0; if exactly proportioned half and half, 50 is marked, and so on, increasing commensurately with the amount of lead contained in the amalgam.

AN IMPROVED FURNACE.

A furnace patented by Mr. James S. Ecker, and designed to utilize the fuel to the fullest advantage, is shown in perspective and in section in the accompanying illustrations, Figure 1 being a sectional side elevation, and Figure 2 a transverse section back of the bridge wall.



ECKER & LAIDLAW'S COMBUSTION ARCH FOR FURNACES.

The top of the bridge wall slants upwardly and rearwardly, and is curved to correspond with the curved top surface of an inverted arch, concentric with the boiler, and forming a segmental space constituting a combustion and radiation chamber just beneath the boiler and extending back to the rear wall. In the rear of the bridge wall, at its base, is an air chamber extending to the rear brickwork and from one side wall to the other, the top of the chamber being arched, and this chamber is connected by numerous openings or ports with the combustion chamber above, formed by the inverted arch immediately under the boiler. Longitudinal ports from the front end of the air chamber lead to a transverse channel in the bridge wall, the latter channel connecting with channels in the side walls of the brickwork which open at their front ends to the air. Suitable doors in the rear of the brickwork give ready access to the air chamber and the combustion chamber to facilitate cleaning when desired. The large body of brickwork forming the arched top of the air chamber and the inverted arch radiating surface beneath the boiler has considerable storage capacity for heat, and in its construction allowance is made for contraction and expansion. The additional supply of air through the ports leading upward from the air chamber is designed to effect a perfect combustion of all smoke and gases.

Further information relative to this improved furnace may be obtained of Messrs. Ecker & Laidlaw, Portland, Oregon.

The Capitol Heater Company, of Detroit, Mich., has met with speedy and surprising success. It only commenced business about a year ago, yet it has already placed its heaters as far west as the Missouri River, and as far south as North Carolina and through pretty much all the intermediate region. Heretofore they have made hot water heaters exclusively, but this year they will commence the manufacture of steam heaters as well. They have recently had to put an electric motor into their works so that they can run nights as well as days.

Cincinnati Wood Working Machinery.

Mr. Thomas P. Egan, the President of the Egan Company of wood working machinery manufacturers, located in the city of Cincinnati, in an interview which was published recently in the *Cincinnati Commercial Gazette*, talks enthusiastically of the development and prospective future in his line of business, and makes the following observations:

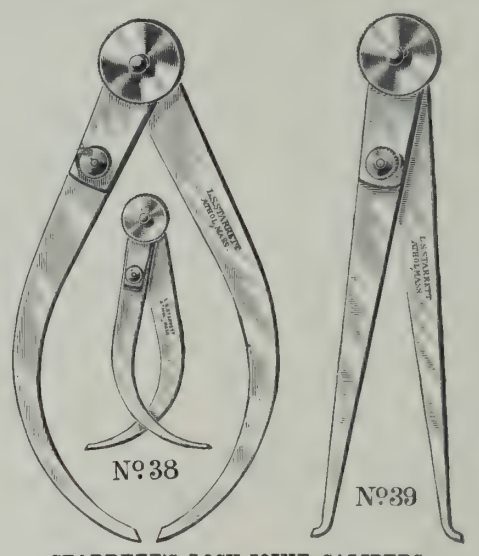
"I may say that this concern has gone through many changes, and had its inception about the year 1870, during what may be called the infancy of the industry. It turns out a general line of machines, such as sash, door, blind, carriage, wagon, spokes, furniture machines, etc. Indeed the variety of machines is almost innumerable, and their styles are continually changing to suit the new designs of the wood workers of all kinds, and to do by machinery that which is still done by hand, whenever its practicability is discovered. This concern has $2,000,000 now invested, and keeps 800 men continually employed.

"I presume, if all that may be ranked as woodworking machines are included, the yearly output of Cincinnati is not less than $3,000,000 annually, which is not only larger than any one city in the world, but larger than several cities combined. I may, in fact, say that Cincinnati has the world-wide reputation of being the chief centre for wood working machinery, and more medals won at Expositions all over the world have come to Cincinnati than have been won by the industry outside of this city. This is in accord with the fact that this concern exports to Europe, against high tariff and all obstructions in the way of heavy freight, about $150,000 worth of machinery annually."

The "Climax Bandsaw Guide" is the name of a new guide recently got out by the Cordesman Machine Company, of Cincinnati, O., for use on their improved bandsawing machines. It is said to be very successful.

IMPROVED CALIPERS.

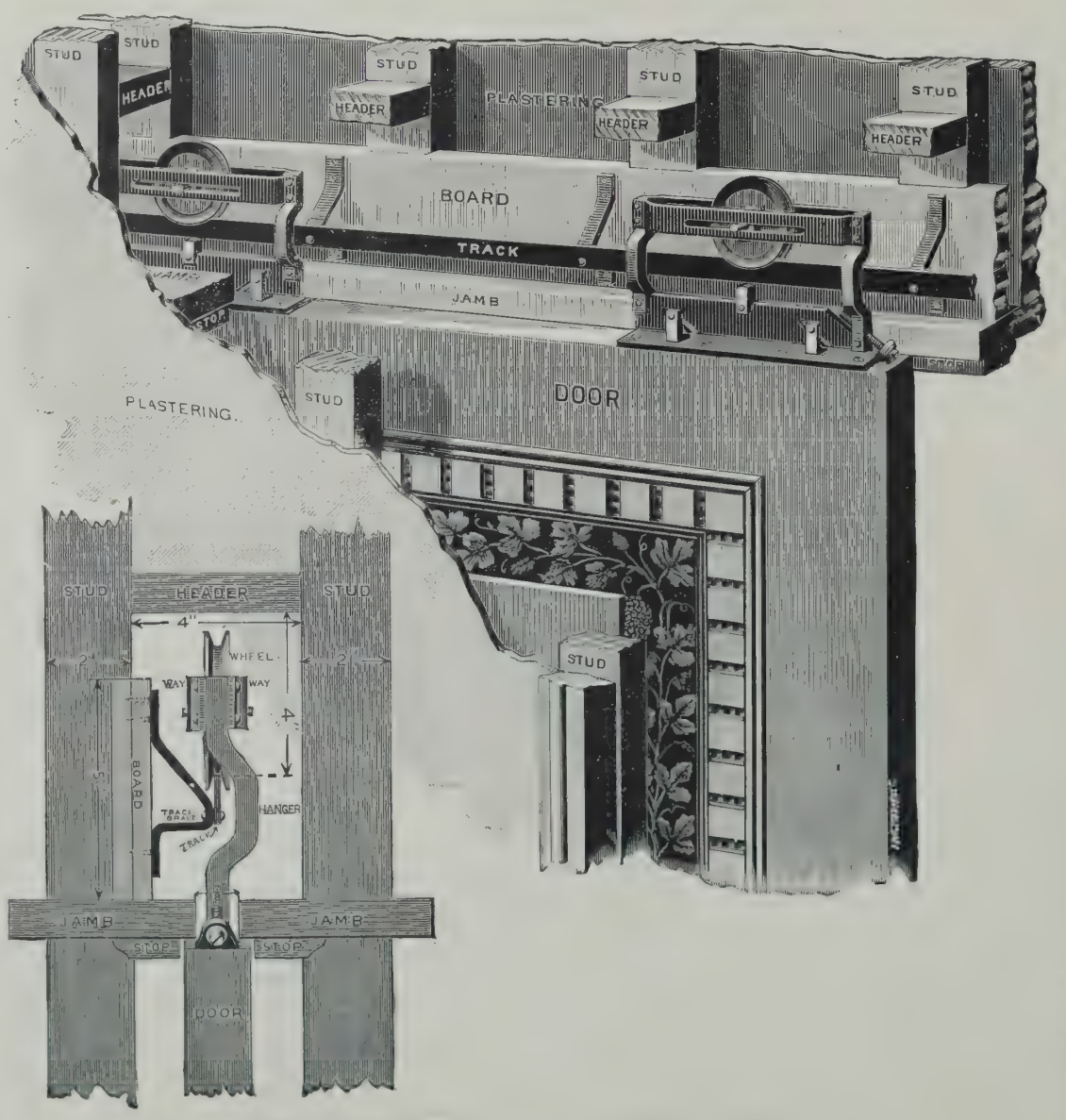
The cuts represent simple, light, low-priced and reliable calipers of wide scope for both inside and outside work, that can be instantly adjusted to their full extent, and as quickly locked firm in the joint, and yet provided with a sensitive adjustment. They are made to supersede the old style firm joint, also the lock joint with split leg adjustment formerly made. The improvement consists, first, in a socket joint made tapering, and locked or released by a partial turn of the knurled disk drawing it together. A spring washer under the disk maintains an easy friction in the joint when unlocked. L. S. Starrett, Athol, Mass., is the manufacturer of these calipers, and also makes a full line of high grade mechanical tools.



STARRETT'S LOCK-JOINT CALIPERS.

AN IMPROVED DOOR HANGER.

The illustration shows this improvement in detail, in working position. It is a marked advance over previous parlor door hangers, both those running on a floor track or overhead, wholly doing away with the double wood track overhead, which must necessarily be fastened to both partitions, and substituting a single steel track, which is easily fastened to the main partition only; thus all danger of derangement by uneven settlement avoided, and, besides, no trouble about swelling or shrinkage. The whole hanger is made of steel, wheel included, except the solid, leather tread which rolls upon a steel track, rendering it as nearly noiseless as possible. Then it is not half the work to place in position as the double wood track, and is sure to remain in good condition for an almost unlimited length of time. The makers, Messrs. Lane Brothers, of Poughkeepsie, N. Y., inform us that their trade is rapidly extending, and that their hanger meets with the unqualified approval of architects generally.



THE LANE STEEL PARLOR DOOR HANGER.

The Cortright Metal Roofing Co., of Philadelphia, report a large increase in their Western trade during the past year. Their Western office has been moved to No. 84 Adams St., Chicago.

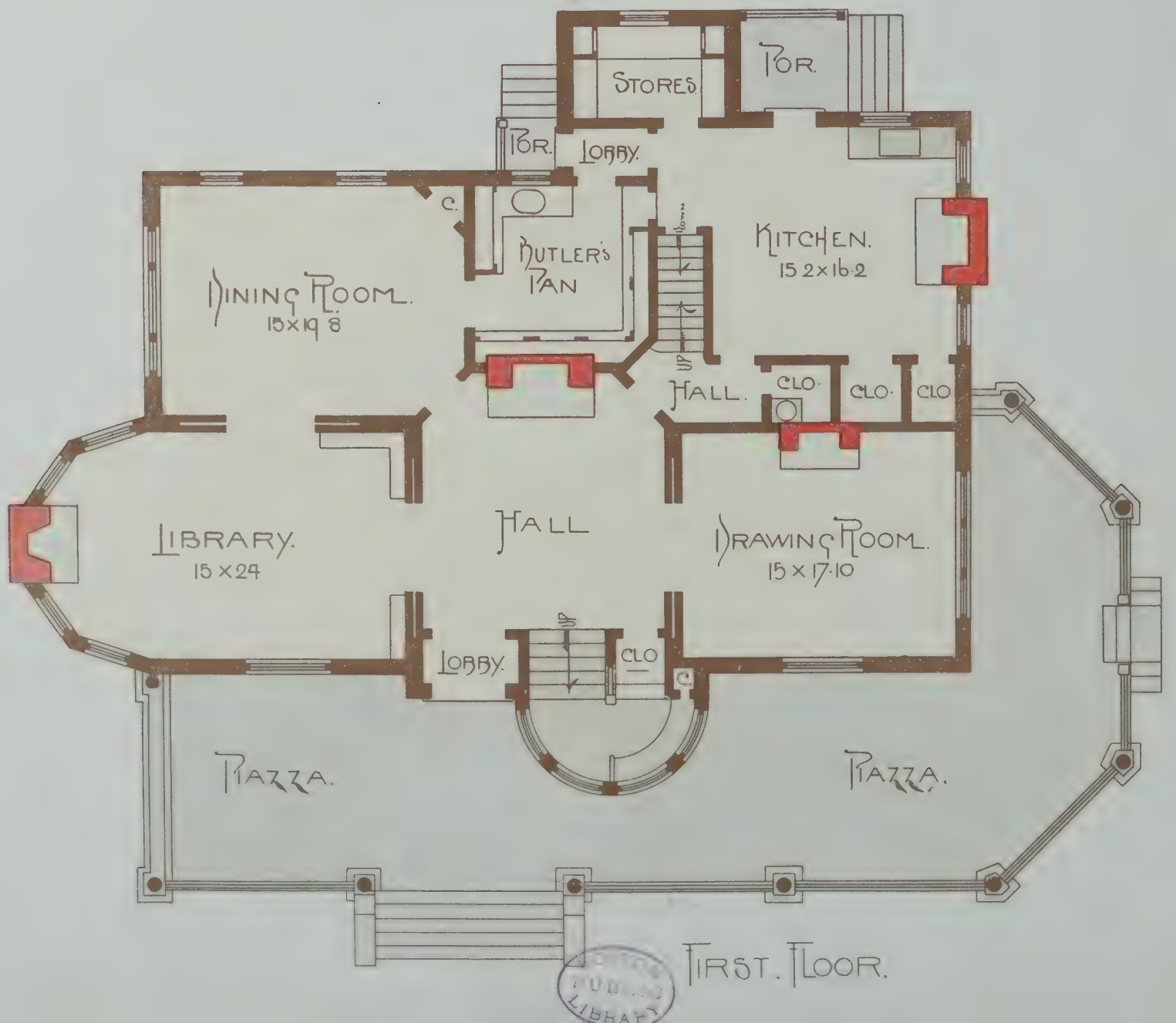
A Big Heater Company.

The American Boiler Company was organized in Chicago on January 23d last, with a capital of $1,500,000, and has purchased the steam and hot water boiler business of the Pierce, Butler & Pierce Manufacturing Co., of Syracuse, N. Y., the Richardson & Boynton Co., of New York City and Chicago, and the National Hot Water Heater Co. By this transaction, the American Boiler Company secures a business which is stated to be at present equal to fully half the entire output of house heating boilers in the United States. The directors of the company are Messrs. W. K. Pierce and Clarence V. Kellogg, of Syracuse, N. Y., Mr. H. T. Richardson, of New York City, and Messrs. A. P. Richardson, George E. Downe, and Henry S. Downe, of Chicago. The headquarters of the company will be located in Chicago, and they have already secured locations for branches in Boston, New York, Philadelphia, Chicago, St. Louis, Denver, San Francisco, and Portland, Oregon.

Messrs. Potts Brothers, of Nos. 48 and 50 Duane Street, New York City, are manufacturers of a very extensive variety of ornamental ground, cut, and embossed glass for dwellings, railroad cars, steamboats, etc. They make a specialty of mitre work.



A RESIDENCE AT PLAINFIELD, N.J.



FIRST. FLOOR.

PUBLIC LIBRARY



A COTTAGE AT MT. VERNON, N.Y.



FIRST FLOOR.



SECOND FLOOR.

PUBLIC LIBRARY

SCHUMACHER & ETTLINGER, NEW YO

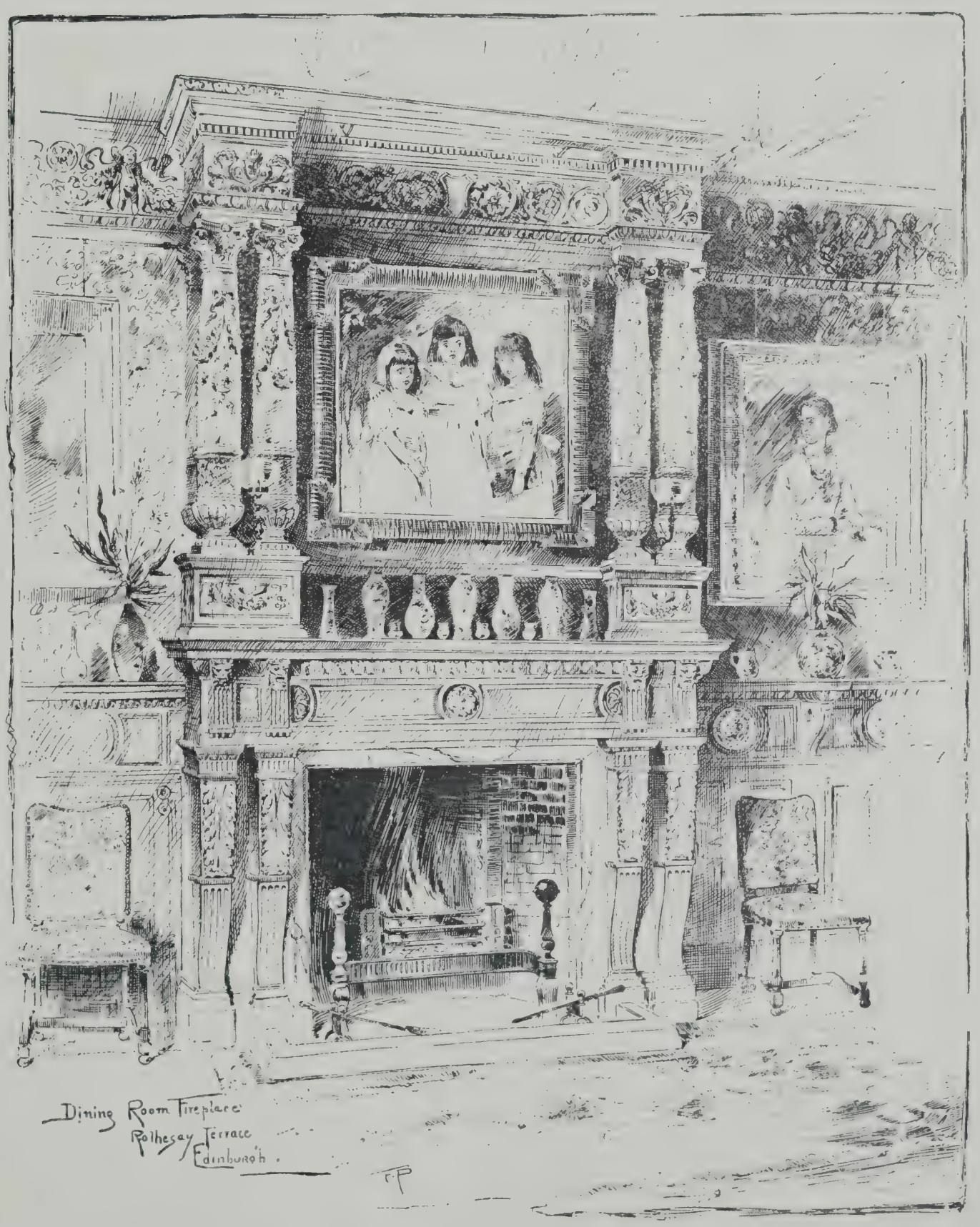
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From "Furniture and Decoration."

A DINING-ROOM FIREPLACE.

Scientific American.

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O. D. MUNN. A. E. BEACH.

NEW YORK, APRIL, 1893.

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A COTTAGE AT MT. VERNON, NEW YORK.

One of our plates in colors this month illustrates a very attractive cottage, recently erected for David A. Van Wie, Esq., at Villa Park, Mt. Vernon, N. Y. The design is pleasing; the piazza, conservatory and tower are the principal features. The underpinning is built of brick, while the building above, of wood, is clapboarded and painted olive brown with darker trimmings. Third story and gables are shingled and painted similar. Roof slated. Dimensions: Front, 39 ft. 10 in.; side, 39 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The interior throughout is trimmed with whitewood. Hall and dining-room are finished in oak, parlor and library in cherry, and the remaining apartments are finished natural. The staircase is a very handsome one, turned out of ash. It is lighted by a window glazed with delicate tinted glass. Parlor has a nook for piano, with a window glazed with stained glass. The fireplace in dining-room is built of brick with tiled trimmings and an oak mantel. Kitchen, pantries and rear hall are wainscoted and furnished with the usual fixtures in a first class manner. The second floor contains four large bedrooms and bathroom. Bathroom is furnished replete. There are two bedrooms and storage on third floor. Cemented cellar contains laundry, furnace and other apartments. Cost $4,500 complete. Mr. Walter Stickels, architect, Mt. Vernon, New York.

Our engraving was made direct from a photograph of the building, taken specially for the Scientific American.

A RESIDENCE AT PLAINFIELD, N. J.

We publish as a subject for one of our plates in colors, in this issue, a residence recently erected for Hon. Craig A. Marsh, at Plainfield, N. J. Additional perspectives and plan are given on page 47. This structure, which is of the Queen Anne style, is situated on one of the handsomest thoroughfares in the city, and it has a frontage of 62 ft. 10 in., and a depth of 43 ft. 8 in., exclusive of front piazza, and consists of basement and three stories. The materials used are a combination of stone, brick and wood. The underpinning and all stonework is built of serpentine stone, from Chester County, Pa., with faces left as they come from the quarry. The first story and part of second story is built of red brick with stone trimmings. The remaining part of second and third stories are built of wood and covered with cedar shingles. The roof is slated and finished with a terra cotta cresting. The striking features of the exterior are the towers, balconies, spacious piazza, and ornamental chimneys, the one in library having a special feature in the way of a semicircle window of stained glass over mantel in library. The principal feature of the interior is the hall and staircase, which is trimmed with quartered oak. Vestibule has a floor laid in mosaic. The walls in hall are paneled with oak up to ceiling and finished with a heavy-moulded cornice. The ceiling is heavily beamed, forming deep panels. It has a parquet floor, and a staircase with carved newels, and a paneled divan on first landing. This staircase is lighted by four stained glass windows, shedding a soft and pleasant light over upper and lower halls. The fireplace is built of brick and terra cotta, and it has a hearth laid in mosaic, and a mantelshelf of oak supported on terra cotta columns. The drawing room is finished in the Renaissance style, and it is treated with ivory-white and gold in a delicate manner. The false fireplace has a tiled hearth, facings of Mexican onyx, and a mantel of exquisite design. Library is trimmed with mahogany. It has a fireplace and bookcases built in complete. Dining-room has a parquet floor, and is trimmed with oak. Kitchen and pantries are trimmed with white pine, finished natural with hard oil Butler's pantry is fitted up with drawers, dressers and shelves inclosed with glass doors. Kitchen is wainscoted with narrow beaded stuff, and is furnished with all the improvements in the best possible manner. The second and third floors are trimmed with white pine, finished natural. The second floor contains three bedrooms, den, billiard-room and bath. The den is treated in ivory-white, and a novel feature is the sliding window opening into staircase hall and forming a balcony. The bedrooms are provided with large closets, and the bathroom is wainscoted with oak, and is furnished replete. Three bedrooms on third floor. Cemented cellar contains laundry, furnace, and other necessary apartments. Mr. Charles H. Smith, architect, New York City, N. Y.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A DWELLING NEAR LONGWOOD, MASS.

We publish on page 48 a dwelling recently completed for L. Shannon Davis, Esq., near Longwood, Mass. The design is quite good. It has a pleasant porch, part of which is shaded, tower containing staircase, bay window, etc. The underpinning is built of rock-faced local granite, laid up and neatly painted. The exterior framework throughout is sheathed, then covered with shingles and stained a sage green, with trimmings and blinds painted a bottle-green and sash white. Roof shingled and stained a darker shade of green. Dimensions: Front, 33 ft. 6 in.; side, 43 ft. 6 in., not including front porch. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. Lobby has a tiled floor. Hall is trimmed with oak, and it contains a staircase of unique design with carved newel posts, etc. The fireplace in hall is built of brick, with hearth and facings of same. The mantel is of oak. Parlor and den are trimmed with whitewood, the former being treated in ivory-white, and it contains a fireplace with tiled facings and hearth, and a mantel with columns, mirrors, etc. Den is finished natural and it has a paneled divan. Dining-room is trimmed with antique oak, and the principal feature is the nook containing the fireplace, which is trimmed with tiles and wrought iron fixtures and provided with a mantel and seats on either side of same. The floors are of hardwood laid in narrow widths. Butler's pantry is fitted up in the best possible manner. Kitchen is wainscoted and trimmed with whitewood and furnished complete. Second floor is trimmed with similar wood, and it contains four bedrooms, large closets and bathroom. Two bedrooms and ample storage on second floor. Cemented cellar contains laundry, furnace and other necessary apartments. Cost $5,200 complete. Messrs. Shepley, Rutan & Coolidge, architects, Boston, Mass.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.

A DWELLING AT MT. VERNON, NEW YORK.

We publish on page 49 an excellent design of a suburban dwelling recently completed for W. B. Gillette, Esq., at Chester Hill, Mt. Vernon, N. Y. The design is of the Colonial style, and it has a piazza, balcony and bay-windows, besides two chimneys on either side, which are a feature in themselves. The underpinning is built of field stone laid up at random. The first story is clapboarded and painted pearl-gray with white trimmings; and the second and third stories are covered with cypress shingles and left to finish natural. The roof is covered with similar shingles. Dimensions: Front, 36 ft.; side, 37 ft., not including rear porch. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The interior throughout is trimmed with cypress and is finished natural. The door and window openings have beaded casings and turned angle blocks. The hall contains an oak staircase of antique design, with spindle newels, balusters and rail. The parlor and dining-room are spacious, and are provided with open fireplaces, built of Tiffany brick and furnished with tiled hearths. The fireplace in library is built of Milwaukee brick. These fireplaces have oak mantels made from special designs. Kitchen and pantry are wainscoted with narrow beaded stuff, and are fitted up complete. The second floor contains five bedrooms and bathroom. Bathroom is wainscoted with narrow beaded oak, and is furnished complete with exposed plumbing. There are two bedrooms and storage on third floor. Cemented cellar contains laundry, furnace and store cellars. The walls are cemented and the ceiling is plastered. Cost $4,750 complete. Mr. W. H. Symonds, architect, New York.

Our engravings were made direct from a photograph of the building, taken specially for the Scientific American.

A DWELLING AT OAKWOOD, STATEN ISLAND.

We present on page 52 a dwelling of low cost, erected for Mrs. M. Blankie, at Oakwood, Staten Island. Dimensions: Front, 37 ft.; side, 27 ft., not including front piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. Foundation, stone. Underpinning, brick. Exterior, sheathed, shingled, and stained sienna with bottle-green trimmings. Roof shingled and painted red. The interior throughout is trimmed with white pine and is treated with colors. Hall contains an ornamental staircase turned out of oak. Library and dining-room have open fireplaces furnished with brick hearths and hardwood mantels. Kitchen and its apartments are wainscoted and are furnished complete. There are four bedrooms and bathroom on second floor, and one bedroom on third floor. Bathroom is wainscoted and is fitted up replete. Cemented cellar contains laundry, furnace and other apartments. Cost $3,540 complete. Mr. W. H. Mersereau, architect, New York.

Our engraving was made direct from a photograph of the building, taken specially for the Scientific American.

A STABLE AT ELM STATION, PA.

We present on page 51 a stable erected for Grove Locher, Esq., at Elm Station, and from plans prepared by the proprietor. Dimensions: Front, 33 ft.; side, 31 ft., not including pit. The building has a good foundation of stone, while the first story is built of rock-faced Chestnut Hill granite laid up in red mortar; second story shingled and painted yellow with bottle-green trimmings. Roof covered with slate. Carriage room, 14 ft. x 30 ft., is well lighted, and it is provided with a carriage wash connected with drain, and a harness closet inclosed with glass doors. Stable contains four stalls and staircase to second floor. The stalls are furnished with the usual ornamental iron trimmings complete. Stable is supplied with water. The walls and ceilings throughout are ceiled up with narrow beaded yellow pine, with a finish in hard oil. Second floor contains two bedrooms and ample storage. The stable was built by days' work at a cost of $2,245. It could be erected for much less by contract.

Our engraving was made direct from a photograph of the building, taken specially for the Scientific American.

A STABLE AT BRIDGEPORT, CONN.

Our engraving on page 51 presents a unique design of a stable which has been erected for E. W. Watkins, Esq., at Park Place, Bridgeport, Conn. It has a stone foundation, and the exterior framework above is covered with sheathing, shingles, and painted Colonial yellow with ivory-white trimmings. Roof and gable are slated. The carriage room, 20 ft. x 26 ft., contains a carriage wash, concreted and connected with drain, and a harness closet with glass doors, etc. Stable, 15 ft. x 26 ft., contains two stalls, box stall, sink, closets, and stairway to second floor. The stalls are furnished with the usual ornamental iron fixtures. The walls, ceilings and partitions throughout are ceiled up with narrow beaded yellow pine, and finished natural with hard oil. The second floor contains man's bedroom and ample storage for hay, grain, etc. Messrs. Longstaff & Hurd, architects, Bridgeport, Conn.

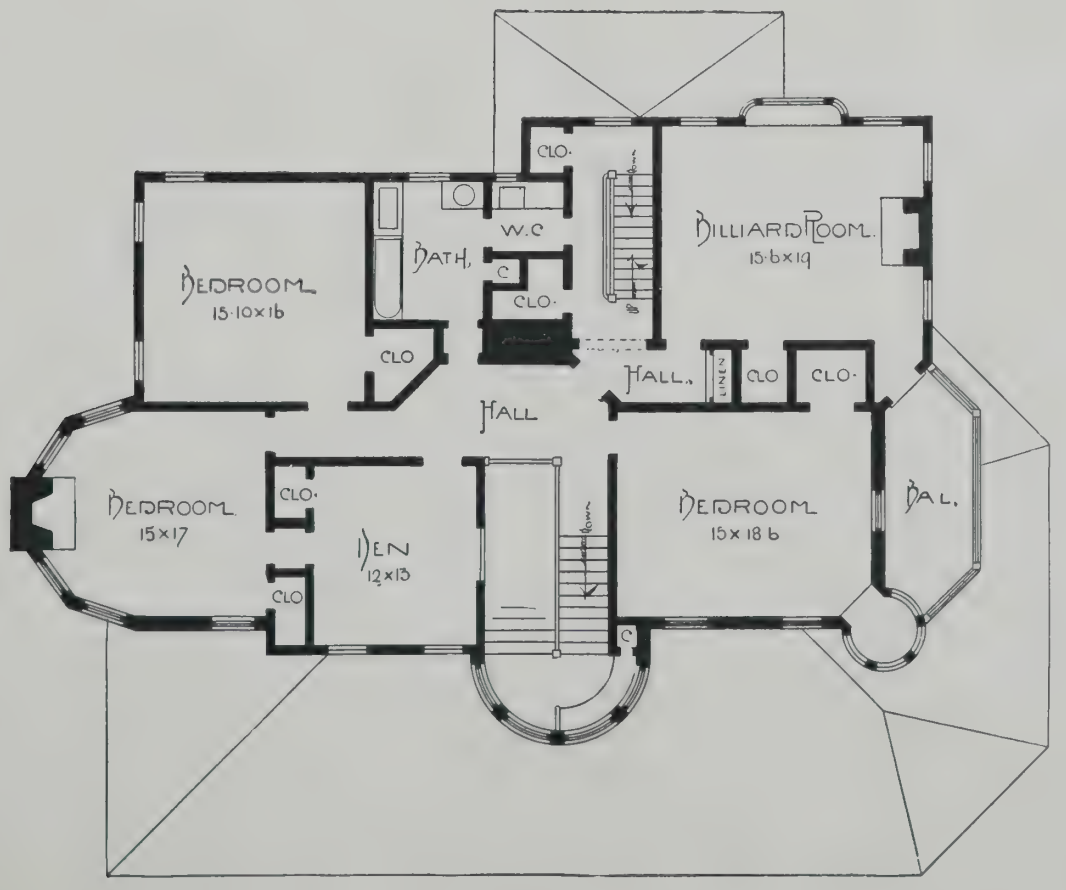
Our engraving was made direct from a photograph of the building, taken specially for the Scientific American.

A RESIDENCE AT WAYNE, DELAWARE CO., PA.

On page 55 we illustrate a residence recently completed for Mr. Frank Smith, on the property founded by George W. Childs, Esq., at Wayne, Delaware Co., Pa. The design presents a very picturesque exterior, and it is treated in Queen Anne and Colonial styles. Large, well shaded portico at front. The special features are the peak gables and dormer windows in roof, on the exterior, and the open grate in lower hall, dining-room removed from kitchen odors, and the parlor with a private entrance to front staircase. The underpinning, balustrade to front piazza, and the main part of first story are built of rock-faced stone of a light grayish blue color, laid up at random and neatly pointed in white mortar. The second story and gable over parlor are veneered on the exterior with Milwaukee brick. The remaining part of the exterior is covered with shingles and stained a yellowish-brown color with bottle-green trimmings. Roof shingled and stained similar. The posts, brackets and plate to piazza are of hardwood, finished natural. Dimensions: Front, 51 ft. 6 in.; side, 46 ft. 6 in., not including front piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. Vestible is paneled with antique oak. The hall is trimmed with oak. It has a large open fireplace, built of pressed brick, with hearth and facings of similar brick and a mantelshelf of oak. The staircase, of oak, is furnished with carved newels, and is lighted by windows glazed with delicate tinted glass. The reception-room is trimmed with whitewood and treated in China white. The parlor and dining-room are spacious and well lighted. They are trimmed with oak; the former having a fireplace with tile trimmings and mantel made from a special design. Butler's pantry is well fitted up with bowls, shelves and cupboards. Kitchen and laundry are trimmed and wainscoted with whitewood finished natural, and are provided with sink, range, dresser and washtubs complete. Back stairs are to landing of front staircase. Second and third floors are trimmed with whitewood. Second floor contains five bedrooms of good size, three of them across the front *en suite*, bathroom and ten closets. Bathroom is wainscoted and furnished replete. Two servants' bedrooms, large hall and store room on third floor. Cemented cellar. Steam heat. Cost $6,250 complete. Messrs. F. L. and W. L. Price, architects, Philadelphia, Pa.

Our engravings were made direct from photographs of the building, taken specially for the Scientific American.



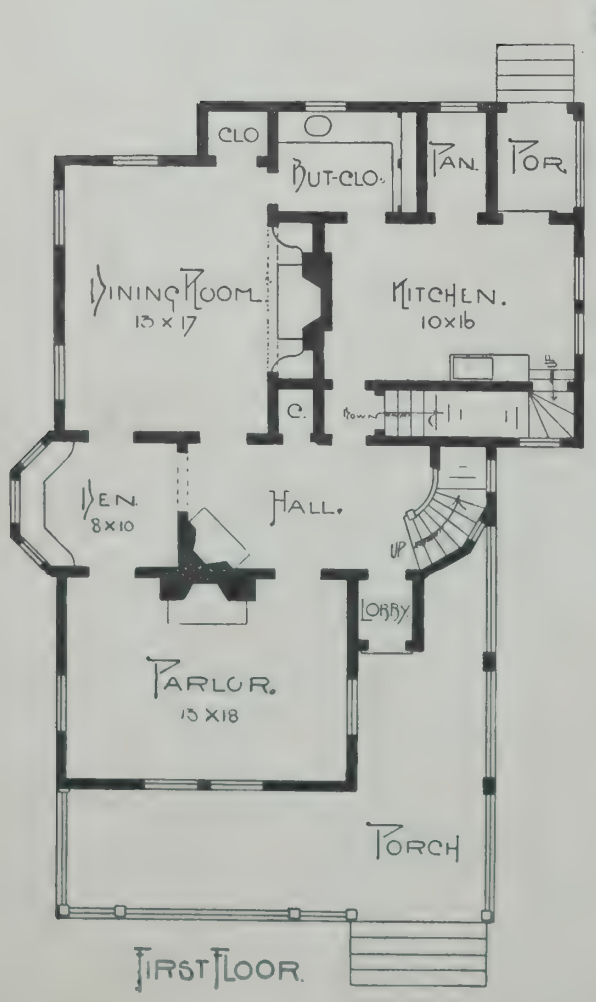


SECOND FLOOR

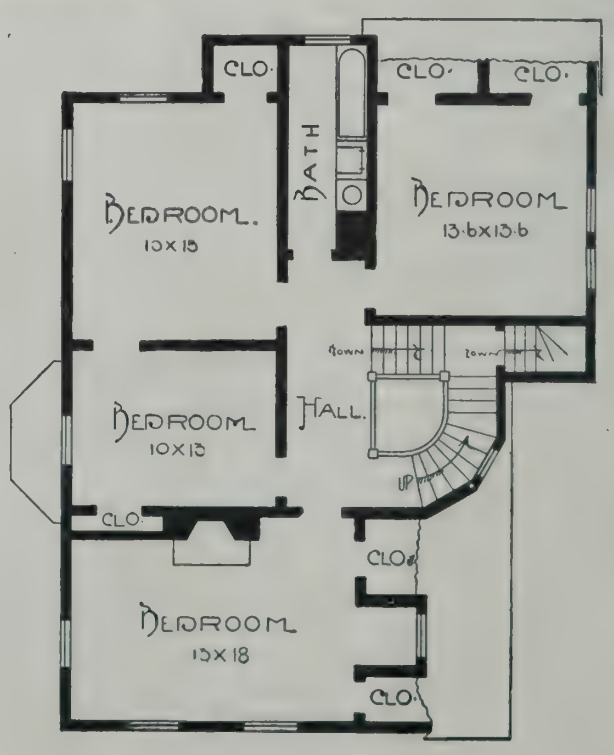
A RESIDENCE AT PLAINFIELD, N. J.—See Page 46.

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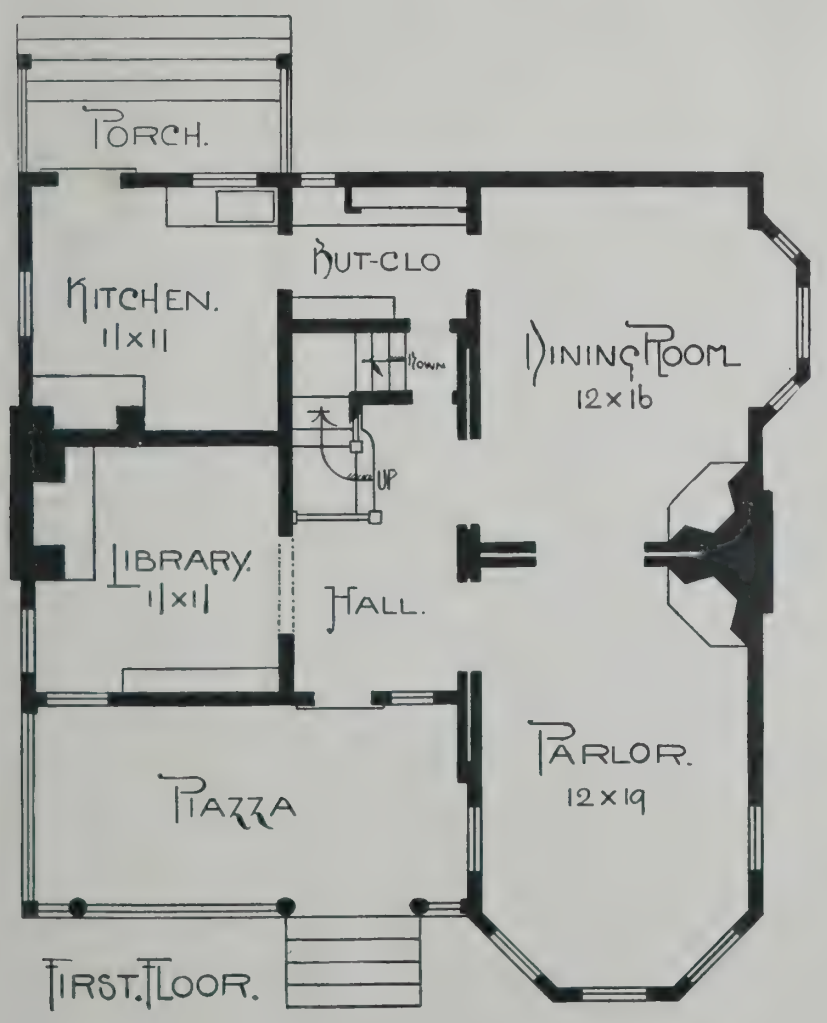
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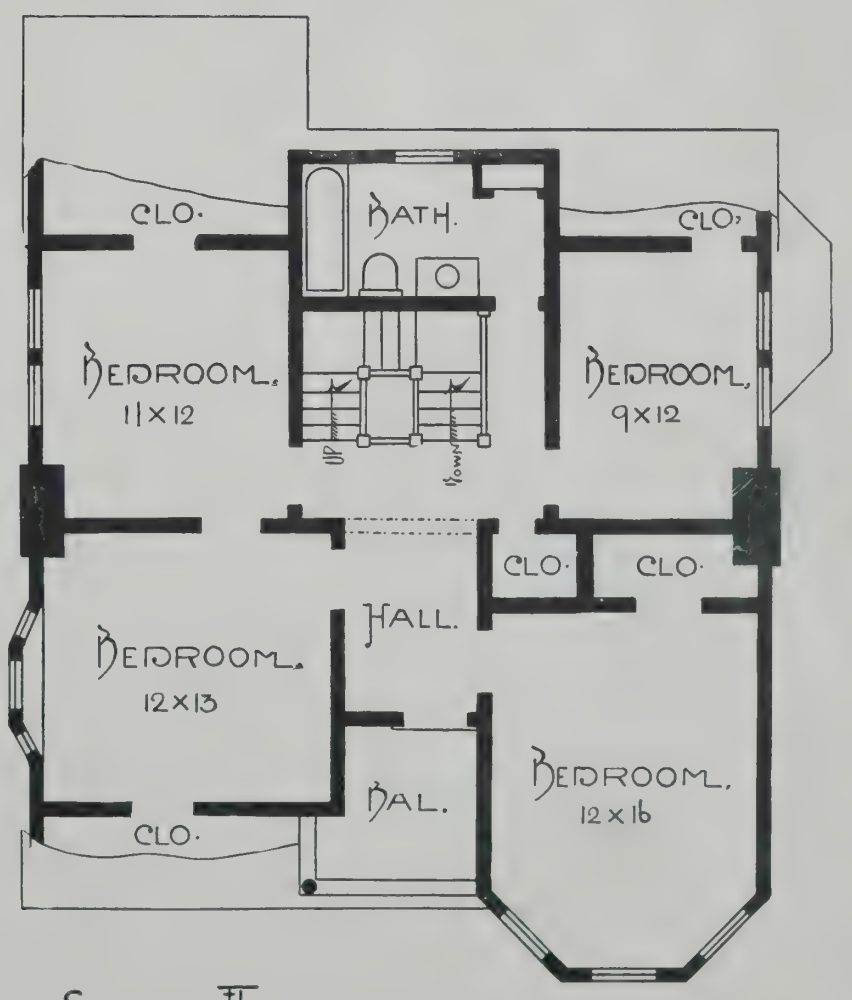


SECOND FLOOR

A DWELLING NEAR LONGWOOD, MASS.—See Page 46.







A DWELLING AT MOUNT VERNON, N. Y.—See Page 46.

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FIRST FLOOR.

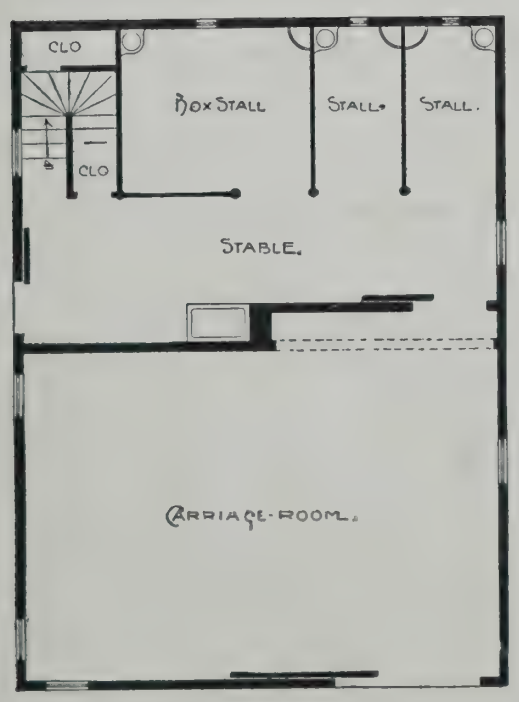
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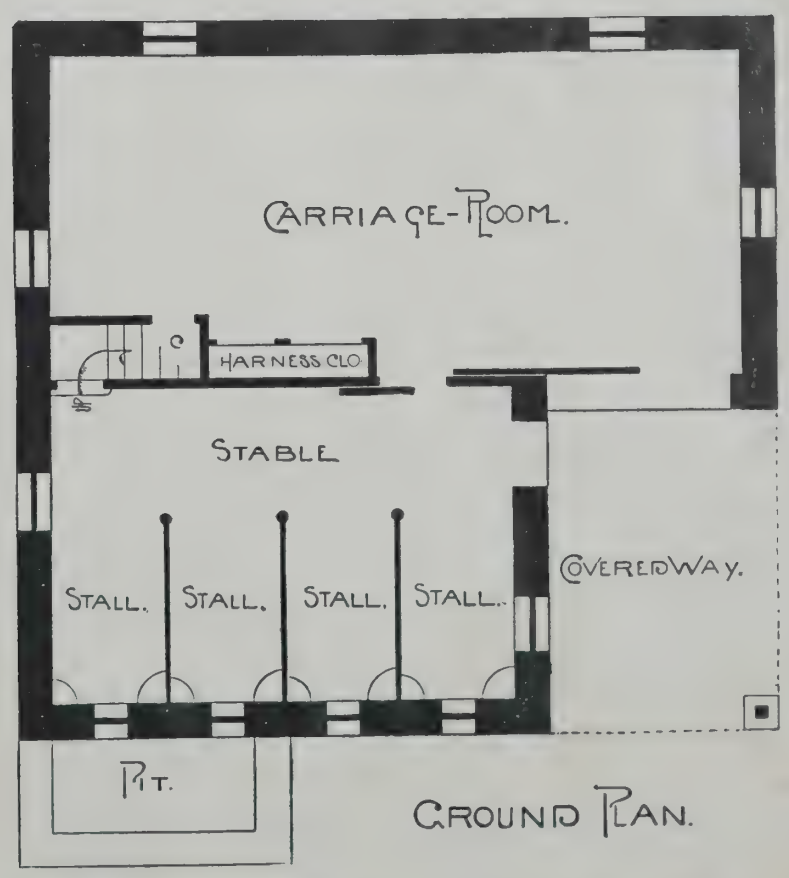
A SQUARE HOUSE AT ALLSTON, MASS.—See Page 56.





GROUND PLAN

A STABLE AT BRIDGEPORT, CONN.—See Page 46.

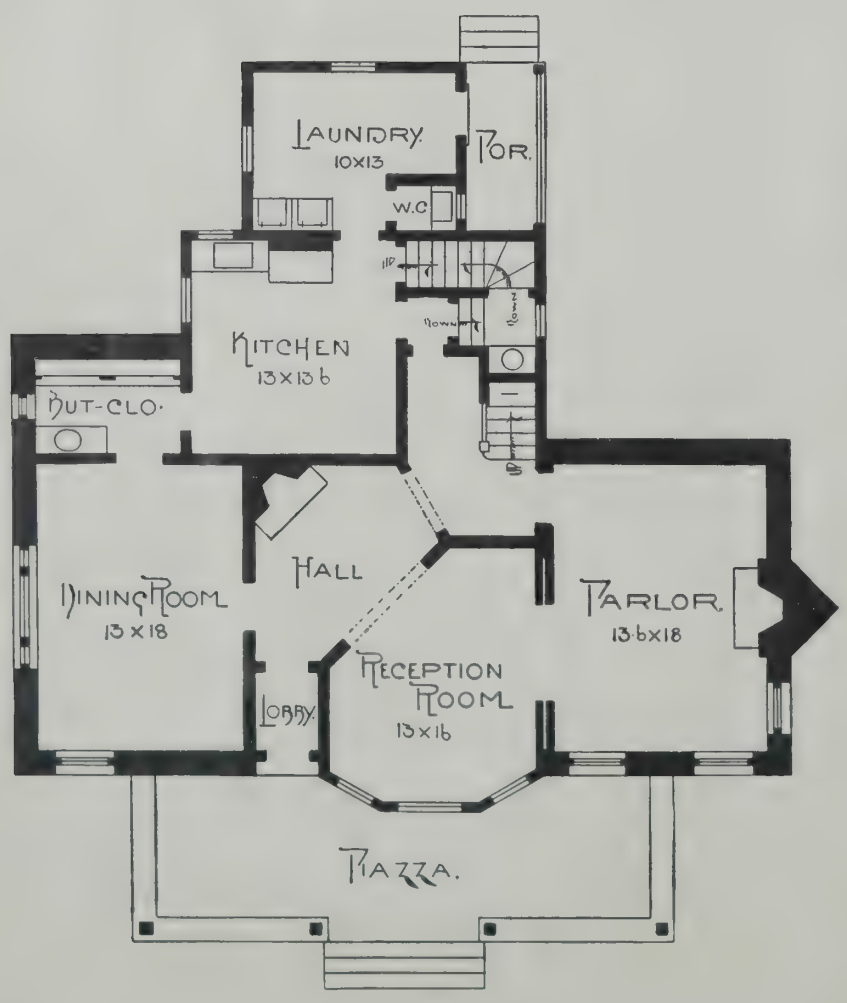


GROUND PLAN.

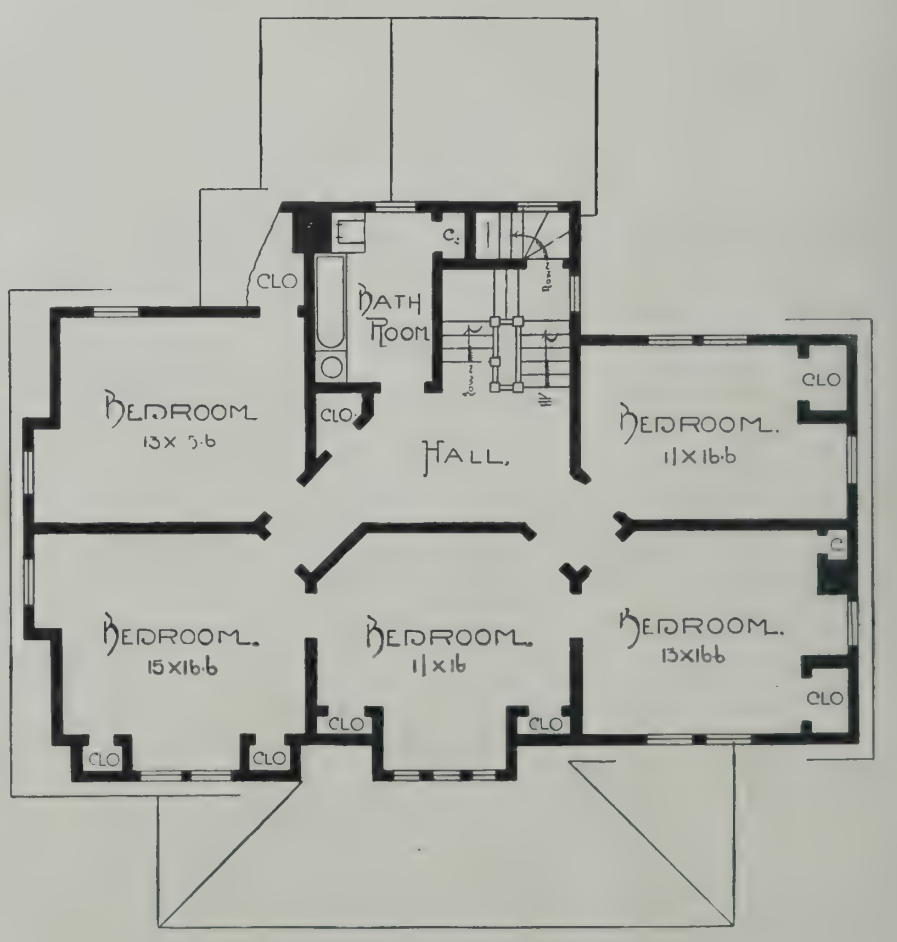
A STABLE AT ELM STATION, PA.—See Page 46.

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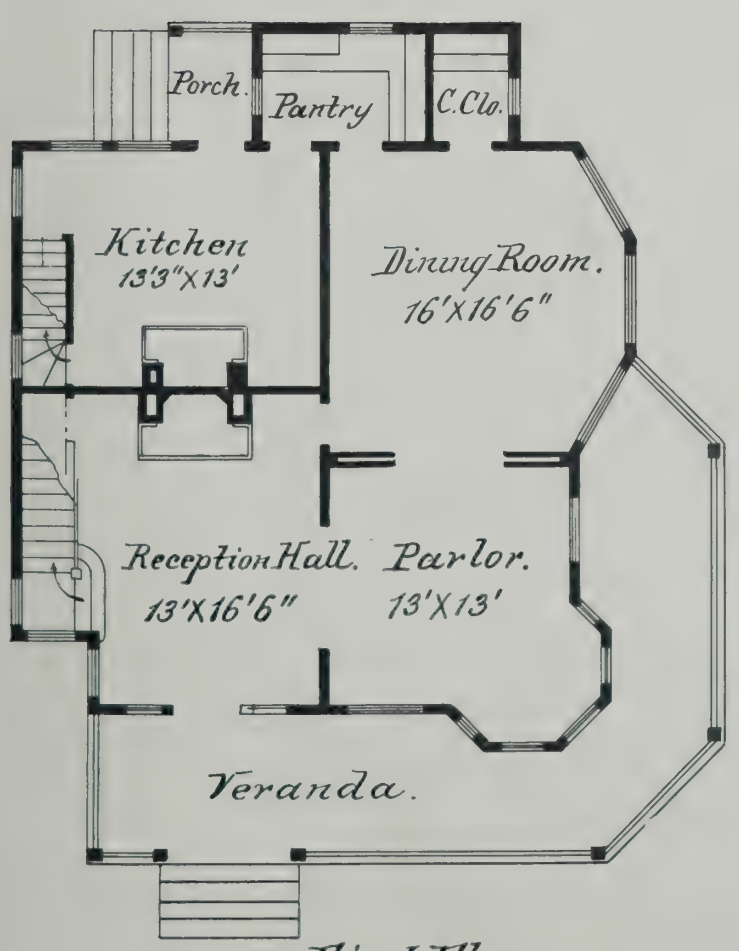
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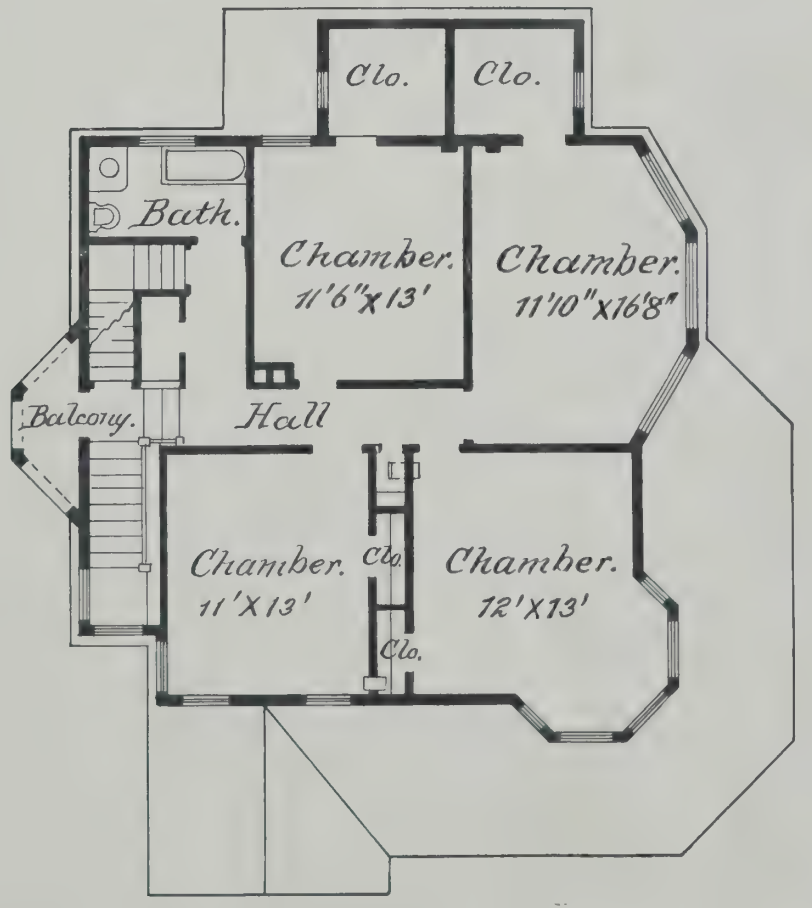
SECOND FLOOR

A DWELLING AT OAKWOOD, STATEN ISLAND.—See Page 46.





First Floor.



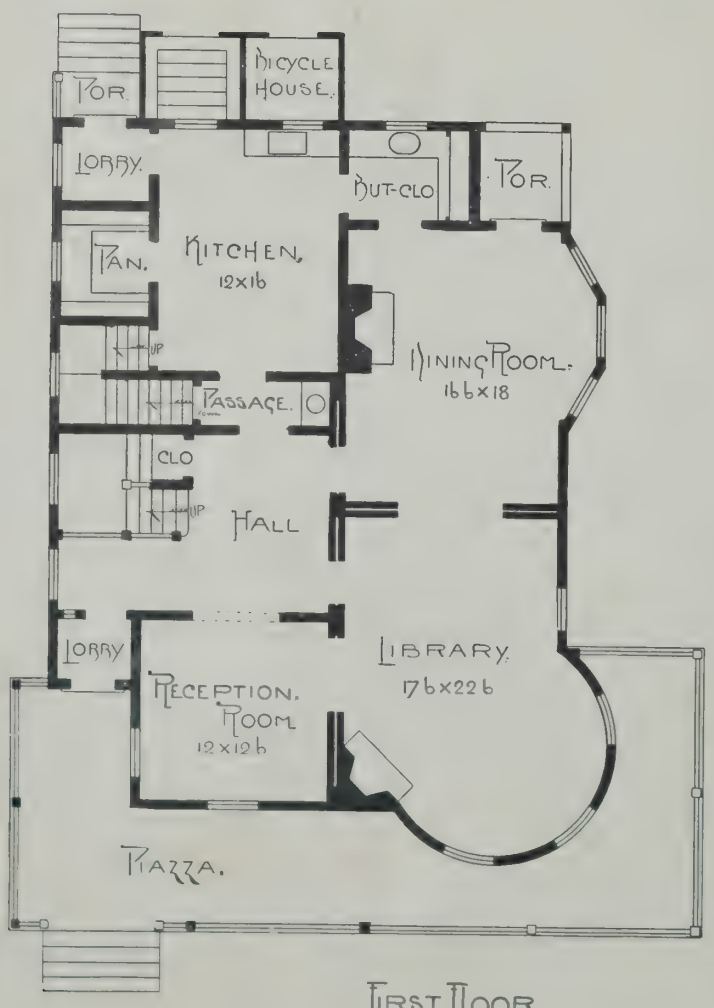
Second Floor.

A RESIDENCE AT BRIDGEPORT, CONN.

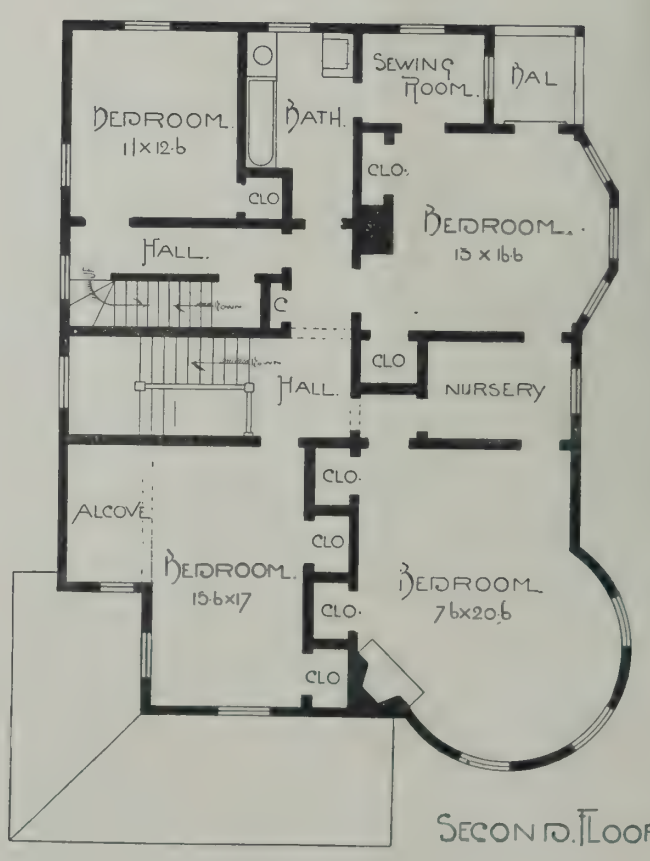
The description will appear in the next number.

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FIRST. FLOOR.



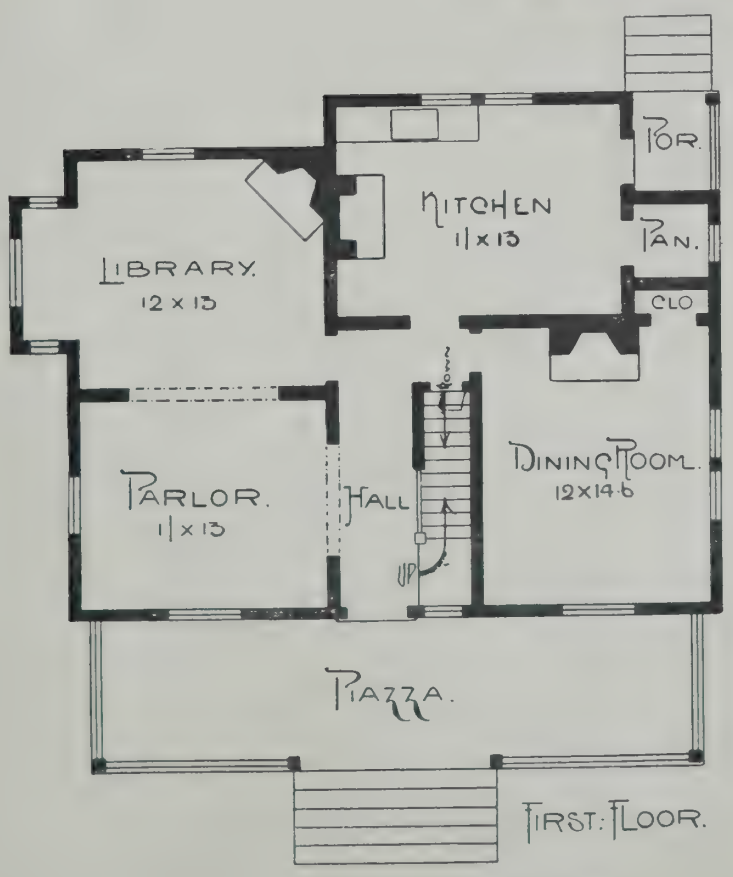
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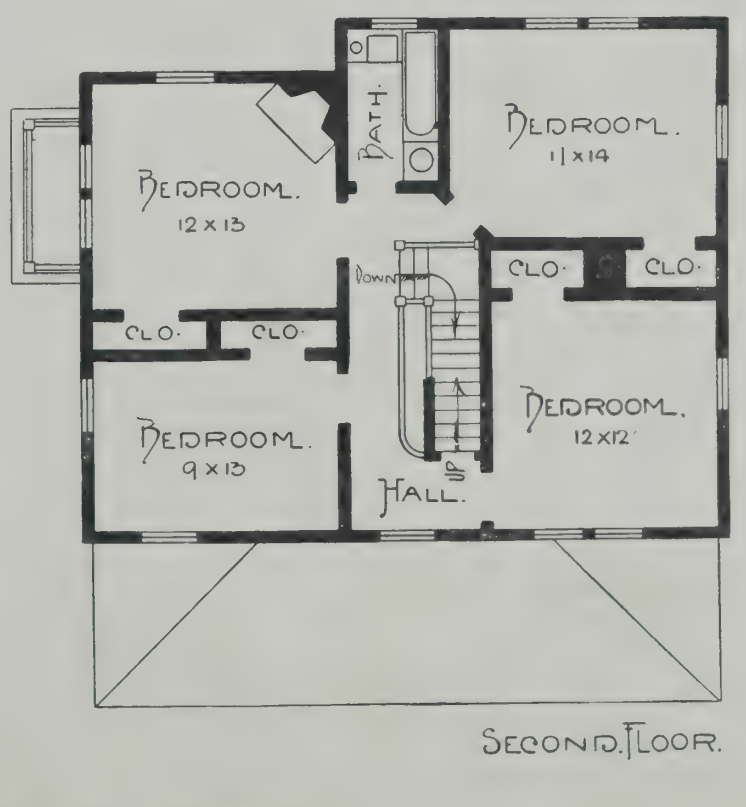
A RESIDENCE AT NEWTON HIGHLANDS, MASS.—See Page 56.

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A RESIDENCE AT WAYNE, PA.—See Page 46.

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A RESIDENCE AT NEWTON HIGHLANDS, MASS.

On page 54 will be found an engraving and floor plans of a residence erected for Alex. Tyler, Esq., at Newton Highlands, Mass. The exterior presents a picturesque appearance, and is treated in the Queen Anne style. It has many features, including piazza, porch, balcony, tower and bay window. The underpinning is built of rock-faced stone. The first story is clapboarded and painted an Indian red with bottle-green trimmings, and the second story and gables are shingled and stained two shades of brown. Blinds are painted bottle-green and the sash cream-yellow. Roof shingled and stained black. Dimensions: Front, 37 ft. 8 in.; side, 49 ft., not including front piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The interior arrangement is excellent, and the several rooms communicating as they do make a most attractive vista of the entire floor immediately upon entering. The various apartments throughout are handsomely trimmed with whitewood. The vestibule and hall are stained and finished in oak, and they have a wainscoting of combed stucco work in metallic colors. The walls above this wainscot are covered with cartridge paper of a dull shade of terra cotta, with frieze to correspond. The broad, low staircase and paneled divan are the features of hall. The carved columns to staircase extend to ceiling, supporting a spindle transom. The reception room is finished in ebony. The walls are covered with cartridge paper of a canary color, with ceiling to match, and a frieze of light blue with pink flowers scattered on the blue ground. The walls in library and dining-room are in light olive-green, the woodwork in library being painted a darker shade of olive-green. The trim in dining-room is finished in oak, and it has a wainscoting similar to hall. The fireplaces, built of brick, have tiled trimmings and hardwood mantels. The floors throughout are laid with oak and highly polished. Butler's pantry is fitted up with bowl, shelves, and cupboards replete. Kitchen is wainscoted with narrow beaded stuff, and is furnished with the usual fixtures. The rear stairway is conveniently located, and forms an access to kitchen from front hall. The second floor contains four bedrooms, nursery, sewing room, bathroom and eight closets. Bathroom is wainscoted and fitted up in a first-class manner. Four bedrooms and storeroom on third floor. Cemented cellar contains laundry and other apartments. Cost $6,000. Messrs. Rand & Taylor, architects, Boston, Mass.

Our engraving was made direct from a photograph of the building, taken specially for the Scientific American.

A SQUARE HOUSE AT ALLSTON, MASS.

We present on page 50 a square rigged house recently completed for D. H. McKay, Esq., at Allston, Mass. Dimensions: Front, 23 ft. 6 in.; side, 38 ft. 6 in., not including piazza and porch. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The design is excellent and the plans present an arrangement which combines both comfort and convenience. The underpinning is built of rock-faced bluestone. The first story is clapboarded and painted Colonial yellow with ivory-white trimmings, and the second story is shingled and stained sienna with white trimmings. Blinds are painted bottle-green. Roof shingled and finished natural. Cemented cellar contains furnace and other necessary apartments. The interior throughout is trimmed with whitewood, finished natural. Hall contains an ornamental staircase with turned newels, posts and balusters. This hall and stairway are lighted by windows glazed with stained glass. Parlor is treated in China white, and it has a mantel made from a special design, with columns, mirrors, etc. The fireplace is built of pressed brick, with hearth laid with same, and is furnished with brass trimmings and dog-irons with grate. Dining-room is separated from parlor by double sliding doors, is well lighted, and has connection to kitchen through pantry, the latter fitted up with shelves, drawers and cupboards. Kitchen is wainscoted with narrow beaded stuff, and provided with sink, washtrays and range. Lobby is large enough to admit icebox. There are four bedrooms with large closets and bathroom on second floor. Bathroom is wainscoted and provided with the usual fixtures. Two bedrooms and storage room on third floor. Cost $2,600. This house could be erected for much less in some localities. Mr. Austin W. Pease, architect, Boston, Mass.

Our engraving was made direct from a photograph of the building, taken specially for the Scientific American.

[Continued from March number.]

The Fifth Avenue Theatre,

NEW YORK CITY.

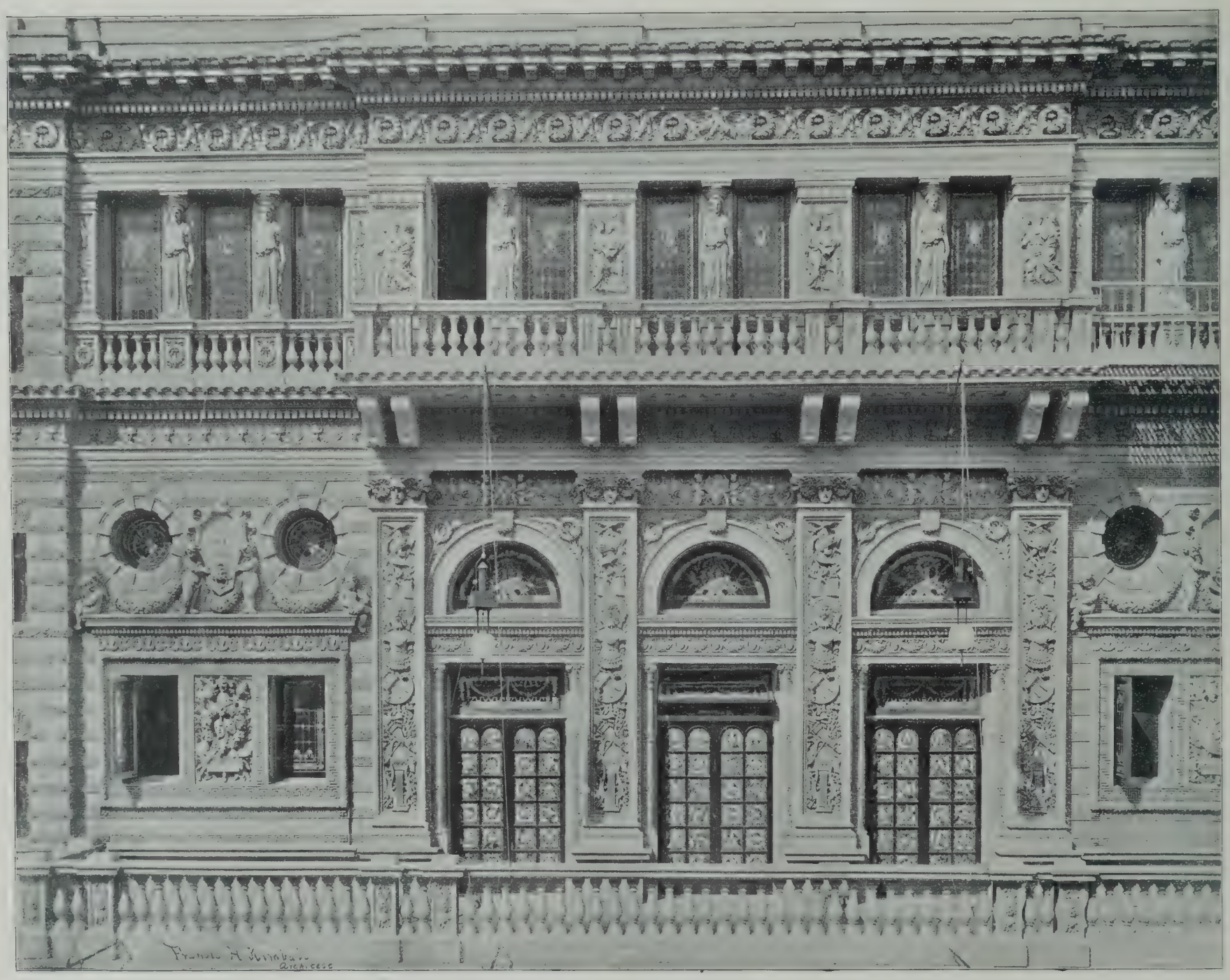
By Henry M. Stevens.

In our last issue we gave an opening chapter in the architectural history of this magnificent structure, of which Mr. Francis H. Kimball is the architect. In the concluding portion of our remarks we described the remarkable ironwork pertaining to the theatre, as erected by the Riverside Bridge and Iron Works, of Paterson, N. J., and we now present on page 57 a plate showing the peculiar nature of the ironwork which enters into the construction of the building. It is probable no theatre in the world can boast of a more substantial framework of iron than that here put in by the Riverside Bridge and Iron Works.

The Terra Cotta Decorations.

The columns of the portico, and the iron structure of the first story back of portico, are relics of the former building, and were retained in their original positions, but the cornice and balustrade of the portico are parts of the new work. Above the first story of the new theatre, all the ornamental features and cornices are wrought in white terra cotta by the New York Architectural Terra Cotta Company, the work having been done under the special direction of the superintendent of the company, Mr. James Taylor. This exterior, so elaborate, on the whole, on account of the employment of this medium of terra cotta, while maintaining the exquisitely delicate and graceful characteristics of the period of the Italian Renaissance, expresses in all its constructive details the continuity of an idea strictly in harmony with the purpose of the building. In a word, it embodies in itself the most appropriate suggestion of the uses of the interior, the grand divisions or principal parts of a theatre, namely, the auditorium and the stage, being illustrated most effectively in the architectural composition, the more elaborate portion presenting the auditorium, and the plainer section the stage.

The wonderful richness and minute elaboration that



THE FIFTH AVENUE THEATRE, NEW YORK. FRANCIS H. KIMBALL, ARCHITECT.

VIEW OF THE MAIN FRONT, SHOWING THE TERRA COTTA DECORATIONS.

such a treatment is susceptible of in clay were never more apparent than in this illustration, and the architect has availed himself of all his opportunities for beauty of design, with a rare judgment and a fertility of invention that are alike commendable. He has been worthily sustained in this by the skillful and remarkably successful mechanical execution of his decorative scheme. These beautiful forms in terra cotta that represent it take the shape of theatrical emblems, and abound in the ornamental part of the 28th Street façade. The panels of the large pilasters between the windows of the balcony foyer are exceedingly rich in these emblems —the grand portico, the large window of the balcony and gallery foyer, and the exit doors from the grand foyer, sufficient of that material is used in the more important division last mentioned to prove not only the adaptability of clay for splendor of effect in architectural composition, but to exemplify, also, the progress of the manufacture of terra cotta work in this country, where it was never used until 1853, when Mr. James S. Renwick, the well-known architect of the Fifth Avenue Cathedral, made an attempt to introduce it as a building material and as a substitute for cut stone work here in New York City.

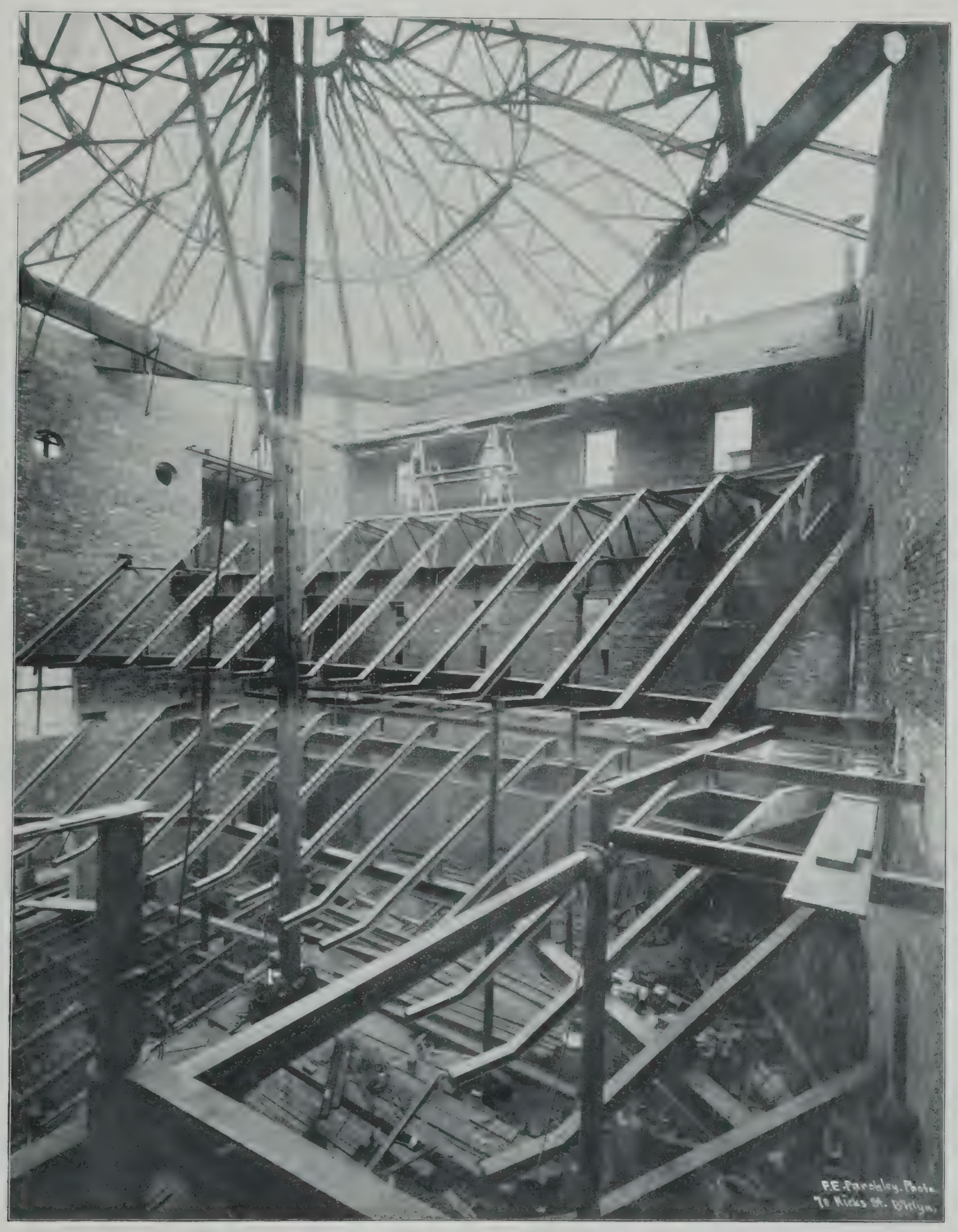
The recognition of the demand for terra cotta led to the organization, in the winter of 1885-6, of the New York Architectural Terra Cotta Company, which secured the services of Mr. James Taylor as Superintendent, who first introduced better methods of making architectural terra cotta in the United States.

The New York Terra Cotta Company's Works are fully equipped with the most powerful, reliable, and useful machinery for the manipulation of clay and the preparation of terra cotta bodies. The best form of muffled kiln is used, which secures a uniform and safe burning of the ware.

One of the features of the works is the photographic department. All architects' plans are photographed, and a copy furnished to the head of each department. As each man finishes his work, that portion is painted out in colored inks; so that an inspection of the photographs gives a graphic representation of the progress of the work. By a comparison and examination of these photographs, the progress and exact condition of every order can be determined at any time, within a few minutes, by the architect, or the builder, or any one interested. This method of following the work through the different stages of execution has been found the most advantageous of any heretofore tried. The negatives of these photographs are all preserved and filed away in cases suitably numbered, so that orders for any work received can be duplicated years afterward from these negatives, without other or supplementary drawings. Besides this, the architects' original drawings are also preserved as an additional precaution.

Terra cotta must always remain as a material in itself —it should never be regarded as a rival to stone. It may not compare with masonry in accuracy of lines, but with it there can be produced, as in the example of the new Fifth Avenue Theatre, a most beautiful surface treatment, with brilliant effects of light and shade and the most charming color imaginable. In short, there is really no other material which affords such scope for the genius of the designer, and no other material which can be so readily impressed with the conception of the artist.

Take, by way of illustration, northern Italy, where terra cotta was at one time carried to a very high point of perfection. The western façade of the Cathedral of Menza; the Cathedral of Crema; the communal building of Piacenza; Santa Maria delle Grazie, in Milan; the Certosa, near Pavia, where the two cloisters are especially magnificent; and Pavia itself, rich in terra cotta decora-



THE FIFTH AVENUE THEATRE, NEW YORK. FRANCIS H. KIMBALL, ARCHITECT.

VIEW SHOWING THE IRON FRAMEWORK ERECTED BY THE RIVERSIDE BRIDGE AND IRON WORKS.

on the parquet floor, forming the composition of the exterior of the auditorium.

On either side of the central feature of the balcony foyer are windows, with ornamental terra cotta panels between, the one denoting Comedy, the other Tragedy. Again, the mullions of the windows of the gallery foyer are in the form of caryatides supporting the main cornice, and in the panels of the larger piers are bas-reliefs representing dancing and singing figures, all these being of terra cotta.

Although the leading architectural lines of the 28th Street side of the theatre are carried throughout the entire front there, the stage portion is less elaborate than that of the auditorium just described, calling for but little decoration comparatively in terra cotta; but

tion, especially the ducal palaces and the churches of Santa Francesco and Santa Maria del Carmine, are familiar to many. The Cathedral of Florence, famous for its singing gallery, by Lucca della Robbia, is also one of the finest examples on record.

New York is to be congratulated upon having secured such unusually attractive work in terra cotta as is exhibited in the 28th Street façade of the new Fifth Avenue Theatre, because it will undoubtedly do much toward establishing a permanent regard for terra cotta as a building material, the facility it affords architects of seeing the actual full-sized details of the more ornamental portions of their designs, before the work is burned, being foremost among its advantages. Where no repetition is intended, no moulds are used; and the work which is afterward to be burned, and which is to take its place in the building, is the model itself. It thus bears the impress at once of the mind of the designer and the skill and knowledge of the modeling artist. It can be studied, improved, or modified, and when satisfactory it can then be burnt. It is, therefore, a far better reflex of the personality of the architect than can possibly be the case in any other building material.

The Fireproof Construction.

While the ironwork is a part of the fireproof construction, there are yet other features to be examined in connection with the theatre that must be classified strictly under this heading.

It is to an architect that we owe the invention of a new system of fireproof construction, which within a few years has revolutionized all preconceived notions in that direction in the building trade.

Raphael Guastavino has identified his name with this invaluable discovery, for it is to his inventive genius that we are indebted for all its advantages. Interesting himself in the purely mechanical and industrial part of his profession—turning to bricks and mortar, to pressure and strain, as factors of paramount importance, in contradistinction to mere details of grace, harmony, and proportion—he has succeeded in obtaining the general approval and acceptance of his theories throughout the entire building world.

In relation to the safety of our places of amusement, Mr. Guastavino found that, in effecting a radical reform, it was not only a question of enlarging the means of entrance and exit, but also of making the seating part of the building absolutely indestructible, as well as the stage, dressing rooms, and other portions of that section of the building.

In drawing his plans for the "Fifth Avenue," Mr. Kimball had realized the success which the Guastavino fireproof arches had attained in the nine story office building he had made for Mr. Austin Corbin, at Broadway and John Street. The value and importance of using these arches in constructing the "Fifth Avenue Theatre" on an absolutely fireproof basis was thus self-evident, and the result was that the Guastavino arches were adopted in the building of parquet floors, galleries, roofs, etc., in this new home of science as well as of art. We present in one of our plates herewith a view showing the general characteristics of this most excellent and reliable system. The serious problems presented in the construction of these arches were successfully surmounted, and the theatre itself stands to-day an embodiment of the most scientific precautions now known to guard against fire. The arches were put up under the personal supervision of their distinguished inventor. The illustration we herewith present shows a view of the main floor, and the ceiling sustaining the first balcony will, in this regard, be of some interest to architects, builders, and capitalists interested in fireproof construction. Among other places of public amusement in which the Guastavino fireproof system of construction has been utilized is the Carnegie Music Hall. Mr. Andrew Carnegie, despite the fact that his foundries at Pittsburgh executed the contract for the ironwork, approved with Mr. W. B. Tuthill, the architect of the building, the Guastavino arches as part of the construction, realizing evidently that their use would economize in the cost of construction, while at the same time give the necessary safety. The Empire Theatre, at Broadway and 40th Street; the Bijou Theatre, Boston; the American Theatre, on 8th Avenue between 41st and 42d Streets, are also examples of the faith of other architects and theatre managers in the Guastavino arches. In the Empire Theatre, all the floors, galleries, and roof work, etc., have been completed, while for the Bijou and American Theatres the contracts have been awarded to the Guastavino Fireproof Construction Company for similar work.

(To be continued.)



THE FIFTH AVENUE THEATRE, NEW YORK. FRANCIS H. KIMBALL, ARCHITECT.

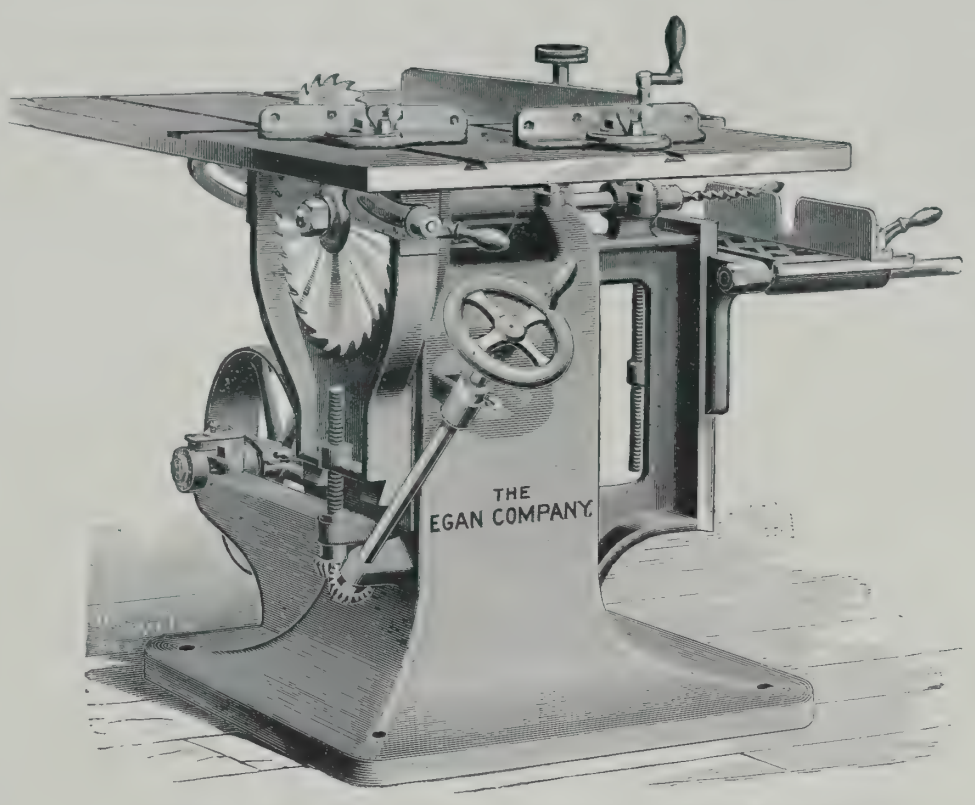
VIEW SHOWING THE FIREPROOF ARCHING ERECTED BY THE GUASTAVINO FIREPROOF CONSTRUCTION COMPANY.

The magnificent new hotel, the "Waldorf," on Fifth Avenue and Thirty-third Street, New York, lately opened, is owned by W. W. Astor, and is valued, with the ground, at over $3,000,000. Architect, Henry J. Hardenburgh. It is thirteen stories high and fireproof.

AN IMPROVED WOOD-WORKING MACHINE.

The machine shown in the illustration is a very convenient and desirable one for general work in almost any kind of a wood-working factory. The column is cast hollow, in one solid piece, with ample floor space, and extension arms for the support of the countershaft. The table is of iron, planed and grooved perfectly true, and made to work straight or on a bevel, also to adjust up and down, and fitted with two mitre guides and one ripping fence. The boring attachment is connected to the column, and has table to raise and lower independent of the main table, so that two men can work at the machine at the same time, without one interfering in any way with the other.

For further information in regard to this machine, address the builders and introducers, J. A. Fay & Egan Co., Nos. 209 to 229 West Front Street, Cincinnati, Ohio.



A VARIETY SAW, WITH TILTING TABLE AND BORING ATTACHMENT.

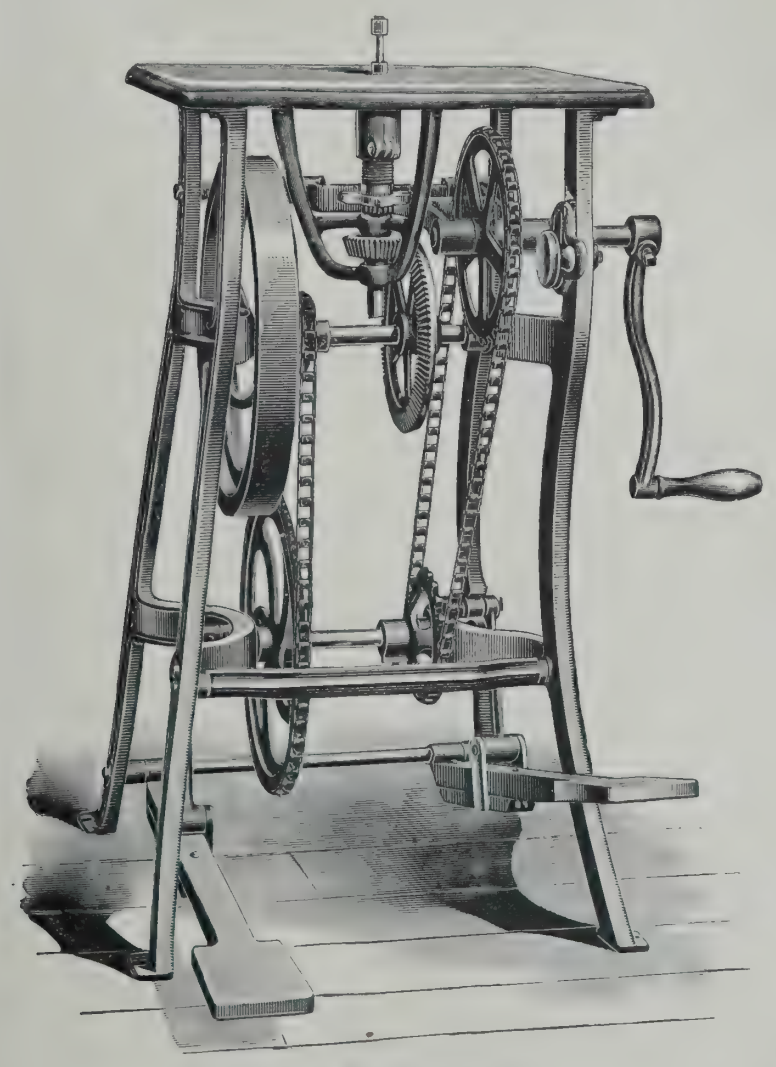
THE municipality of Cadiz, Spain, offers a premium of 30,000 pesetas ($6,000) to the author of the best plan for a proposed sewerage system. The competition remains open until December 20, 1893.

Plans and Specifications.

Full plans and specifications complete, ready for the builder, may be obtained at this office, for any of the structures illustrated in this publication. We also prepare plans for buildings of every description, including dwellings, churches, schools, stores, barns, carriage houses, etc. Our work extends to all parts of the country. We are assisted by able architects. Terms moderate. MUNN & Co., 361 Broadway, New York.

A NEW EDGE MOULDING OR SHAPING MACHINE.

This is a machine designed for carpenters, cabinet makers, and all woodworkers who desire to finish straight, circular, curved, or irregular work with moulded edges. It is designed especially for edge moulding, using cutters up to one inch face, but if desired the spindle can be readily adjusted so as to cut beads, flutes, or other styles of mouldings, in the centre of a four inch panel. It is strong and thoroughly made, has iron frame, steel spindle and shafts, Babbitt metal lined boxes, and hardwood table. The spindle is easily and accurately adjusted up and down by simply turning a hand screw, and has adjustable boxes to take up the wear. The power is transmitted by a chain belt and gears, doing away with any slipping or lost motion. The foot power has a walking motion, by which much greater power can be obtained with less fatigue than with any other kind in use, and it enables the operator to run the machine with both feet, sitting, or one foot, standing, as desired. The speed by either foot or hand power is such as to insure smooth, clean and rapid work. With the use of this machine articles may be made rich and costly in appearance that otherwise would look plain and cheap. The moulding cutters furnished for this machine are reversible, and the spindle may be run either way to suit the grain of the wood. Weight of machine, 170 lb. Boxed for shipment, 250 lb. Manufactured by The Seneca Falls Manufacturing Company, 276 Water Street, Seneca Falls, N. Y., who also make a full line of foot and hand power machinery for wood and metal workers.



THE REX MOULDER.

The Box Industry.

The box industry is an enormous consumer of lumber, and every little while something comes to light that indicates its magnitude. For example, there is in Chicago a manufacturer of prepared coffee who uses 800 boxes a day in this business. These particular boxes are made of three-eighths inch stuff and measure 22x22x32 inches. This means an annual use of about 2,750,000 feet. This is a small thing in itself, but when the multitude of such uses are considered, it seems to be no surprising thing that Chicago box factories alone should use 125,000,000 feet of lumber annually, and that through the country at large the box business consumes more than any one other industry, unless it be the building trades.

It is estimated by an officer of the Iowa Egg and Poultry Shippers' Association that 2,000,000 cases of eggs are shipped out of Iowa each year. Two concerns in Ottumwa ship 105,000 cases to Providence and Boston. Almost every town in the country has its use for boxes. In the little city of Dubuque alone there are thirty-two concerns that use boxes in a wholesale way. Like most lines conducted on a large scale and in which there is much competition margins are small, and any margin at all depends on the most careful and economical handling; and yet, as the box business is an enormous consumer of stuff that would otherwise be valueless, it is of positive financial benefit to the saw mill man, and gives a steady value to woods which except for box use would find a limited market.—*Timberman.*

THE auger that bores a square hole consists of a screw auger in a square tube, the corners of which are sharpened from within, and as the auger advances, pressure on the tube cuts the round hole square.

Natural Gas at Geneva, N. Y.

Mr. S. K. Nester, maltster, at Geneva, has completed sinking a well on his premises, and from which he has obtained an enormous flow of natural gas. The New York Central Iron Works Company, manufacturers of the celebrated Dunning steam and hot water heating boilers, have secured the first contract for the use of the gas, to be used for operating and lighting their entire plant.

Plaster of Paris Floors.

The French, who have carried the art of hardening plaster to where it is utilized for flooring, either in place of wood or tile, use six parts of good quality of plaster intimately mixed with one part of freshly slaked white lime finely sifted. The mixture is then laid down as quickly as possible, care being taken that the trowel is not used on it for too long a time. The floor, adds the *National Builder*, should then be allowed to become very dry, and afterward be thoroughly saturated with sulphate of iron or zinc, the iron giving the strongest surface, the resistance to breaking being twenty times the strength of ordinary plaster. With sulphate of zinc the floor remains white, but when iron is used it becomes the color of rusted iron; but if linseed oil, boiled with litharge, be applied to the surface, it becomes of a beautiful mahogany color. Especially is this the case if a coat of opal varnish is added.

THE *Canadian Architect* sensibly suggests that in building brick houses in positions where they are not protected by surrounding property, not to forget that hollow walls will add greatly to the convenience of the occupiers. They will render the house cooler in summer and warmer in the winter, and will assist in materially keeping the house dry. The cost of hollow walls is only very little higher than that of walls built solid.

INSIDE SLIDING WINDOW BLINDS AND SCREENS.

Since the first of the year the Monroe Manufacturing Co., of Lima, Ohio, have been refitting and remodeling their factory, putting in new machines, etc., for the purpose of manufacturing the Hill Improved Patent Inside Sliding Window Blinds and the Perfection Sliding Window Screens, a cut of which is given herewith. Owing to the rapidly increasing demand for both blinds and screens, they have discontinued the manufacture of mill work, turning their whole attention to the articles mentioned; for, while they have closed many large contracts, they expect that 1893 is going to be a very prosperous year in their line of trade, and will be pleased at any time to send catalogues to applicants therefor.



THE HILL BLINDS AND SCREENS.

City Pavements.

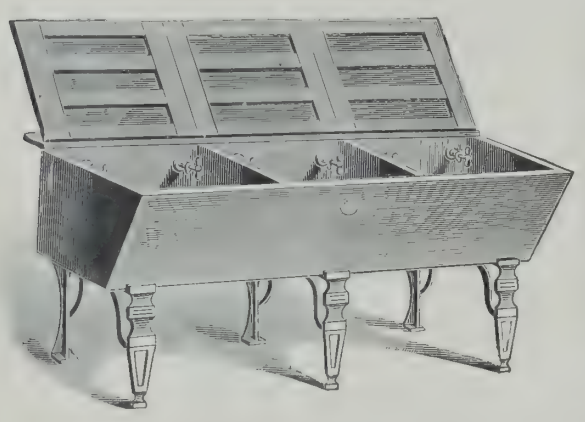
Mr. Thomas Appleton says: It is a common, but I believe erroneous, notion that the joints or seams between the blocks of a pavement are essential for a foothold for horses. I grant that with any hard stone which polishes under wear it is absolutely necessary that there should be a limit to the polished surface in order that the horse can stand up at all, but a horse is less liable to fall upon a macadam or asphalt pavement than upon a stone pavement, and the yielding surface of the cedar block pavement gives a better foothold than brick or stone. In my opinion, sheet asphalt should be transferred to the other end of the list. It has such a perfect surface that a horse's hoof comes immediately into position for work, there is no rocking of the fetlock joint, no slipping down into a crevice, no sliding off from a rounded summit. Besides, no such effort is required to start a heavy load as is necessary in starting on a stone or brick pavement. I should rank the materials under this classification as follows: Sheet asphalt, macadam, cedar block, brick, granite, cobblestone.

I doubt the utility of tables giving the cost of pavements for so long a term as fifty years. There may be several better pavements invented than any we now know of within the next ten years. One generation is about as far ahead as we ought to look.

In the present state of the art, I believe that for Chicago and its immediate vicinity there are but two kinds of pavement to use: First, if the abutting property can stand it, sheet asphalt; second, sapless cedar blocks.

THE ALBERENE LAUNDRY TUB.

The Albemarle Soapstone Co., manufacturers of the Alberene Stone Laundry Tubs and Kitchen Sinks, have been steadily increasing their business for some few years past, and their product has become a standard article for



THE ALBERENE LAUNDRY TUB.

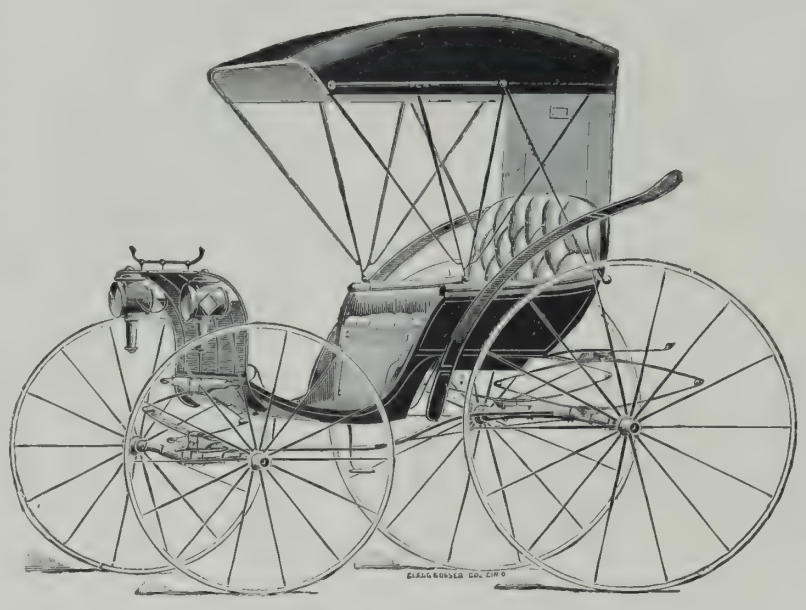
laundry furnishings. The Alberene Stone is beyond doubt among the hardest and finest stones ever used for this purpose. It comes out of the planers and groovers without chipping or splitting, so that the finished product is as nearly perfect as mechanical skill and first-class material can make it. The fittings, also, which go with these tubs are of the finest quality, so that the tub complete, with plugs, legs and covers, is most satisfactory to the purchaser. The tub legs used are designed and made solely for this company, and constitute a pleasing finish to the tub itself; while the covers, being paneled ash, will resist the tendency to warp and twist, in covers commonly used for this purpose. It is seldom that quality and lowness in price are combined, but with the Alberene tub the price has been lowered to a point where even the cheapest style of house can afford to have it. These tubs may be obtained through any plumber or supply dealer, or direct from the manufacturers, at 393 Pearl Street, New York.

The highest chimneys in the world are two in Glasgow, one being 468 feet high, and the other 455 feet, while one near Cologne comes next with a height of 441 feet.

Mr. H. A. Klotz, manufacturer of artistic wood mantels, at No. 97 West Harrison Street, Chicago, is the successor of the Lewis Manufacturing Company in the same business, and will continue to furnish customers with the same class of high-grade goods on the most reasonable terms. Those interested in this detail of interior finish for fine residences will do well to send for a catalogue.

THE "MURRAY" PHAETON.

The cut represents a phaeton, built by the Wilber H. Murray Manufacturing Co., of Cincinnati, O. There are many different styles of phaetons, and the Murray people always have something good to offer in the newest styles and latest patterns. They are well known, and their celebrated $5.95 harness and $55.95 buggies are in use in every part of the world. They manufacture a complete line of all kind of vehicles and harness, and issue one of the finest catalogues in their line ever published, which they mail to applicants.



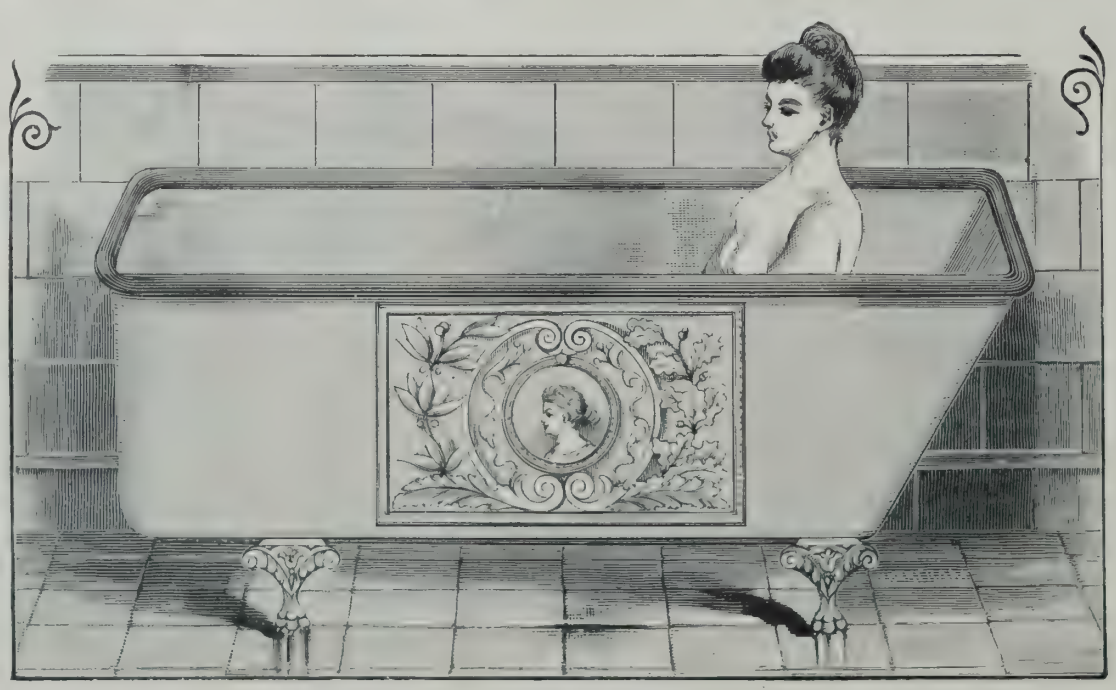
THE "MURRAY" PHAETON.

The captains of ships which carry bricks have to be very careful. An ordinary brick is capable of absorbing a pint of water. So, with a cargo of bricks in the hold, serious leakage may quite well go on undetected, for the water that enters is sucked up as fast as it gets in. If this should be the case, the consequences are bound to be most serious.

AN ELEGANT BATH TUB.

The bath tub shown in the illustration, with or without automatic valve, has all the necessary and desirable features of a first-class article of this description. It is handsome, easily cared for, durable, light, and economical in the use of hot water, and in its construction special attention has been given to the latest sanitary regulations. The material of which this tub is made is of the best twenty gauge steel, manufactured especially for this purpose. The inner and outside surface is heavily enameled by a new process which will not crack or discolor. The rim is made of the best hardwood obtainable, polished and varnished in the best manner. The copperplated panel on side is very ornamental and adds materially to the handsome appearance of the tub. The weight is only 75 pounds, reducing the cost of transportation and making it very adaptable for summer residences without regular bathrooms. It stands open and raised from the floor, and is always easy of inspection, allowing no closed spaces for collection of dust and foreign matter. It meets all the latest requirements and is a very desirable tub for public institutions.

The manufacturers are Fred. F. Bischoff & Co., No. 24 and 26 W. Lake Street, Chicago, Ill.



THE BISCHOFF SHEET STEEL BATH TUB.

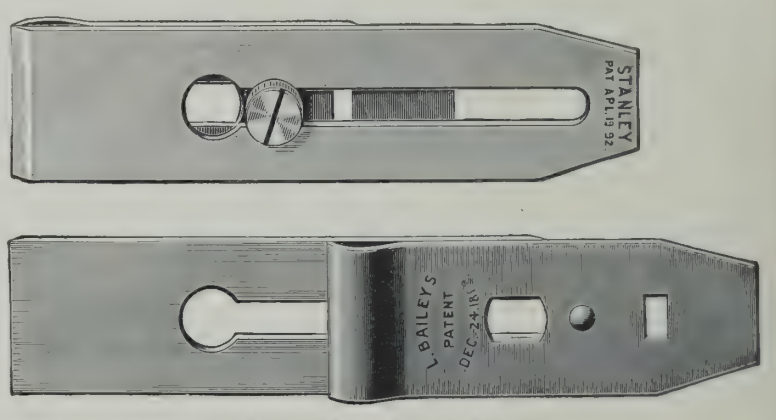
To Thaw Out Frozen Pipes.

The *Builders' Gazette* recommends as an easy and cheap method of preventing pipes that are on or near the surface of the ground from freezing, to cover them first with a thin layer of sawdust, spent tan bark, or any kind of litter. Next, a layer of quicklime in lumps the size of a hen's egg up to the size of a large orange, and over this place another thick litter to retain the warmth. The theory of this is, that the gradual slaking of the lime will develop sufficient heat to prevent freezing of the pipe. A covering of this sort, if properly protected, will prevent a pipe from freezing during an entire winter, the heat from the slaking lime being given off slowly. Pipes that have been frozen can be quickly thawed by covering them with a layer of quicklime in lumps, and slaking it by pouring on water. The object of the layer of litter next to the pipe is to prevent corrosion by contact with the lime.

Pipes exposed may be prevented from bursting in freezing by a very simple device. Water, like everything else, contracts in volume, slightly, by cold, to a certain point—the freezing point. Unlike everything else, water, as it freezes, suddenly expands with a force nothing can resist. Pipes and vessels of the toughest metals burst as easily as clay pipes from the freezing of water so confined in them as to permit no room for its expansion. If a short piece of rubber hose, securely tied at each end, so as to prevent the air in it from escaping, is inserted inside the water pipe, about the point where it is most likely to freeze, it will prevent the bursting of the pipe. The expansion of the freezing water is counteracted by the compression of the air confined in the rubber hose, and thus relieves the pressure on the pipe.

IMPROVED PLANE IRONS.

The plane irons shown in the illustration are made from one piece of steel, and not of a plate of steel welded on to a piece of iron, as formerly constructed. The location of the circular opening at the end nearest the cutting edge removes all liability of the metal being cracked in tempering. Likewise, in using the cutter up to the lower edge of this circle, the chance of its being broken or cracked is greatly lessened. A chief attraction, however, to the mechanic is that the improved form of this plane iron makes it unnecessary to separate the parts at any time, as the connecting screw will slide back to the extreme end of the slot, with no danger of falling out. When secured there, the cap becomes a convenient handle for use in sharpening the cutter.



THE NEW STANLEY PLANE IRONS.

These plane irons are manufactured by the Stanley Rule & Level Co., New Britain, Conn.

A very simple method of laying the foundations on a swampy location, which did not furnish a firm subsoil, was employed, says the *Great Divide*, by an American engineer for supporting a low wooden building to be used for storage of machinery. Casks were set in holes in the ground along the line of posts, and were filled to the depth of about one foot with iron turnings. The posts were set in the casks, which were then filled with iron turnings compactly rammed in place. A solution of salt and water was then slowly poured over these turnings, which compactly solidified into a hard mass. The heat of the oxidation of iron was so great that the posts smoked and were charred, the latter fact probably being the reason why they have not as yet exhibited any signs of decay, and in this respect the use of iron turnings furnishes an advantage over the use of concrete for cask foundations.



A RESIDENCE AT BRIDGEPORT, CONN.



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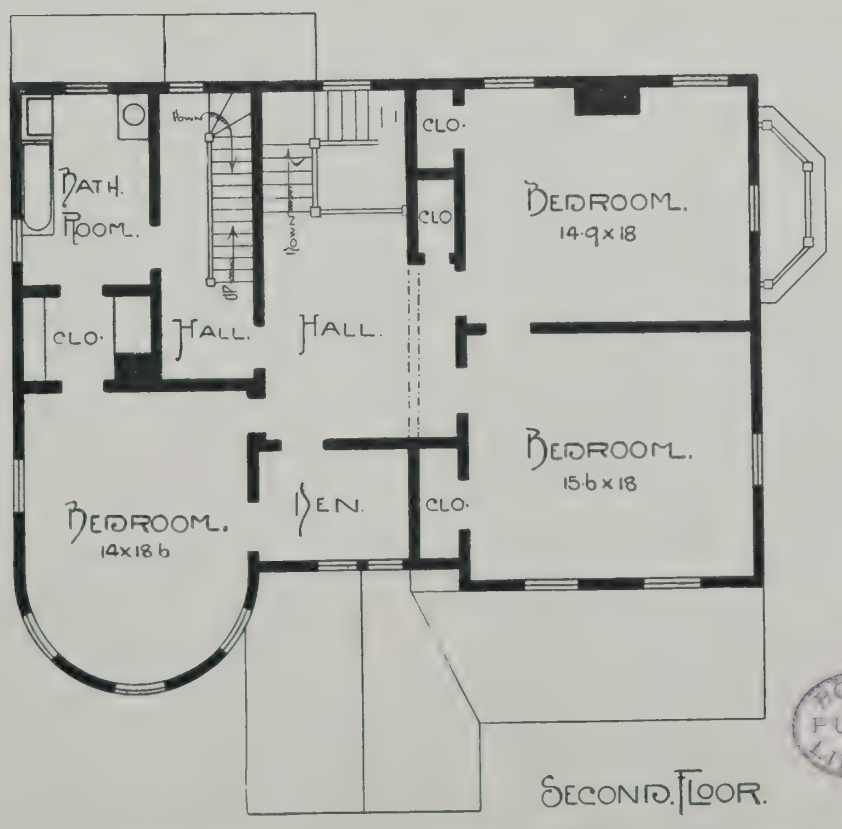
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A RESIDENCE AT RUTHERFORD, N. J.—See Page 62.

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A RESIDENCE AT BRIDGEPORT, CONN.

We publish as the subject of one of our colored plates in this issue, a residence recently erected for Frederick Banks, Esq., on Clinton Avenue, at Bridgeport, Conn. An additional plate is given on page 63. The design is excellent, with its spacious piazza, balcony, bay windows, and porte-cochère, and the interior is laid out with a view to unite convenience and elegance. The materials are of the best, the construction of the most substantial character, and the workmanship unsurpassed. The underpinning is built of rock-faced bluestone, while the first story above is built of brick laid in red mortar. The second and third stories are covered with shingles and stucco work. Roof is covered with octagonal cut slates. Dimensions: Front, 41 ft. 2 in.; side, 61 ft., exclusive of piazza and porte-cochère. The vestibule walls and ceilings are entirely of oak and paneled, the floor laid in mosaic, and the inside doors are glazed with beveled plate glass the full length.

The hall is trimmed with oak. It has a highly polished floor of oak, a paneled wainscoting, and a fireplace with tiled hearths and facings, and an oak mantel, carved, and with shelf supported on Colonial columns. The broad staircase, of exquisite design, is provided with carved newel posts and seat on second floor. This staircase and both halls are lighted by windows, glazed with delicately tinted glass. Reception room, in the Renaissance style, is treated in ivory-white and gold. The parlor is trimmed with red mahogany, the mantel being of special design. The fireplace has a tiled hearth and facings. Dining-room is in antique oak with dado. The floors are of oak, and the facings to fireplace are of tile, and the mantel of oak with beveled plate mirrors. The china closet is unique. It has a counter shelf, with cupboards under same and shelves over, inclosed with doors glazed with beveled plate glass. The butler's pantry adjoining is trimmed with white ash, and it contains drawers, cupboards, bowl, etc. Kitchen is trimmed and wainscoted with similar wood, and is provided with fireplace for range, sink, pantry, and closet, all furnished with the usual fixtures in the best possible manner. The rear hall and stairway are private from cellar to third floor. The main bedroom floor is trimmed with whitewood finished natural, with the exception of den, which is stained and finished in black walnut. Bathroom is wainscoted and provided with porcelain tub, etc. Exposed plumbing. Dressing-room is provided with a stationary bowl. Third floor trimmed with whitewood, contains two large bedrooms and two trunk-rooms. Cemented cellar contains laundry, furnace, and other necessary apartments. Messrs. Longstaff & Hurd, architects, Sanford Building, Bridgeport, Conn.

Our engravings were made from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT RUTHERFORD, NEW JERSEY.

We publish as the subject of one of our colored plates in this issue, a residence recently erected for Joseph Rutan, Esq., at Rutherford, New Jersey. An additional plate is given on page 61. The design is attractive, and it contains pleasing elevations and a well arranged plan, showing many large rooms, which are handsomely finished. The underpinning is built of rock-faced red sandstone. The exterior framework above is covered with sheathing boards, felt paper, and clapboards; the latter are painted olive-yellow with olive-brown trimmings. Gables are shingled and are painted similar. Roof covered with cut slates. Dimensions: Front, 49 ft. 8 in.; side, 41 ft. 4 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The interior throughout is trimmed with whitewood, finished natural. The floors are laid with narrow beaded Virginia pine. The hall, spacious, extends through the centre of the building. It contains an ornamental staircase, lighted effectively by stained glass windows. The parlor and library are connected by double sliding doors. Library is provided with a fireplace, furnished with a tiled hearth and a hardwood mantel. Bookcases are built in on either side of fireplace. Dining-room has a fireplace built of brick, with hearth laid of same. Kitchen is wainscoted with narrow beaded stuff, and it contains all the improvements, fitted up in the best possible manner. The second floor contains three large bedrooms, den, and bathroom. Bathroom is wainscoted and fitted up with the usual fixtures complete. There are two bedrooms, and ample storage on third floor. Cemented cellar contains furnace and other necessary apartments. Mr. F. W. Beal, architect, 318 Broadway, New York City, N. Y.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT PLAINFIELD, NEW JERSEY.

We present on page 65 engravings and floor plans of a residence erected for W. B. Wadworth, Esq., at Plainfield, New Jersey. The design is a pure example of the Romanesque style of architecture, and the interior is treated in the same style. The lines of the exterior are well broken, with good effect, and the plans show many large rooms, conveniently arranged and finished in a very handsome manner. It is built of Haverill brick laid up in red mortar, with trimmings of Long Meadow sandstone. The woodwork at the second story, rear, is covered with shingles and stained sienna. The gables are also shingled and stained similar. Roof shingled. Dimensions: Front, 68 ft.; side, 38 ft. 6 in, not including front piazza. Height of ceilings: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft. 6 in.; third, 8 ft. 6 in. That graceful leaf, the acanthus, is introduced throughout the first story, the design being carved in the mantels, newel posts, and buffet with artistic effect, and is also used in decorating the walls and ceilings. The hall is trimmed with antique oak. It has a paneled wainscoting, five feet high, and ceiling beams. The principal features are the broad, low staircase, paneled divan and fireplace, the latter being built of Tiffany brick, with a lintel of rock-faced Long Meadow sandstone. It has a tiled hearth and a mantel of oak with columns

The staircase is built in a unique fashion, with broad landings. It is lighted by four windows glazed with stained glass, giving an excellent tone of coloring over both halls. The drawing room is trimmed with white mahogany, and is treated in a delicate manner. The fireplace is provided with Mexican onyx facings, a tiled hearth, and a carved mantel with small cabinets on either side. The library, spacious and well lighted, is trimmed with San Domingo mahogany, and it contains bookcases, window seat, fireplace, and nook for piano, with music rack built in with leaded glass doors. The fireplace has facings and hearth of Breccia marble and a massive carved mantel. This library has also a paneled wainscoting and ceiling beams.

Dining room is trimmed with old English oak, and it has a paneled wainscoting, eight feet high, and ceiling beams. The buffet is of unique design with leaded glass doors, and the fireplace is furnished similar to the others already described. Butler's pantry, kitchen, and rear hall are trimmed and wainscoted with ash, and are furnished with the usual fixtures in the best possible manner. The servants' hall and stairway are private from cellar to third floor. The second floor is trimmed with ash and whitewood, and it contains five bedrooms, large closets, and bathroom. Bathroom is wainscoted and fitted up complete. The third floor contains five bedrooms and trunk room, all trimmed with whitewood. Cemented cellar contains laundry, furnace, and other necessary apartments. Messrs Hartwell & Richardson, architects, Boston, Mass.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A DWELLING AT UTICA, N. Y.

We publish on page 64 a dwelling erected for J. F. Hughes, Esq., at Utica, N. Y. The design is treated in the Old Colonial style. It has a quaint and picturesque appearance, and it contains a pleasant porch, piazza, and bay window. The Dutch chimney is also a feature. A novel idea shown in the plans is the piazza and porch floors, which are laid on a level with the floors of the interior. Access to this piazza and porch is gained through sliding doors that are glazed with plate glass. The underpinning is built of brick. The building above this is sheathed, and then covered with white pine shingles, finished natural, with trimmings painted white. Roof shingled and finished similar. Dimensions: Front, 30 ft.; side, 44 ft., not including piazza and porch. Height of ceilings: Cellar, 8 ft.; first story, 9 ft. 6 in.; second, 8 ft. 6 in.; third, 8 ft. The first floor is trimmed with cypress. The hall is separated from living-room by an arch supported on Colonial columns. The fireplace is built of brick, with facings of same, and is provided with a hearth of marble, laid in mosaic, and a mantelshelf. This hall has also a paneled divan. Living-room, spacious and well lighted, is fitted up with a piano window, glazed with stained glass. Dining-room has a transom over window, glazed with similar glass. Kitchen and pantries are trimmed and wainscoted with white pine, finished natural, and are fitted up in the best possible manner. The two front bedrooms on second floor are trimmed with white mahogany, while the other apartments are trimmed with white pine. The bathroom is wainscoted and provided with the usual fixtures. The front bedroom contains a pleasant nook, with divan and fireplace. Third floor contains a large billiard-room and storage. Cemented cellar contains furnace, laundry, and other necessary apartments. Cost $4,700 complete. Mr. W. H. Symonds, architect, 160 Fifth Avenue, New York City, N. Y.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

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SECOND FLOOR.

A RESIDENCE AT BRIDGEPORT, CONN.—See Page 62.

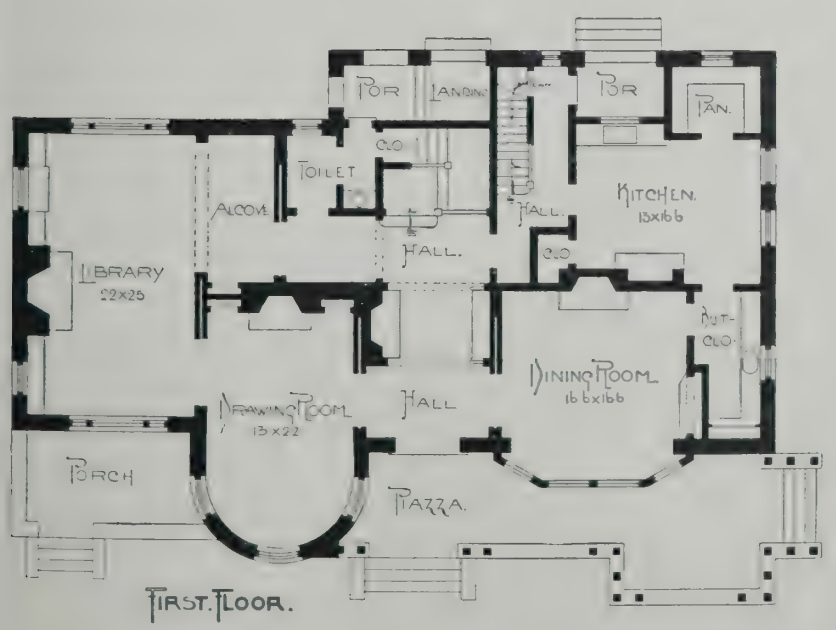




A DWELLING AT UTICA, N. Y.—See Page 62.

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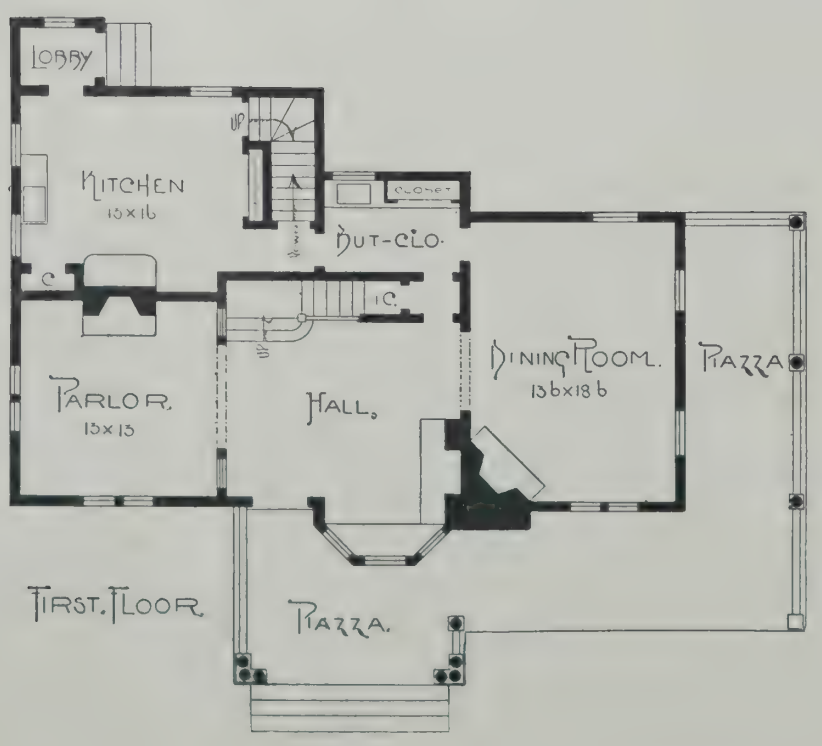


SECOND FLOOR.

A RESIDENCE AT PLAINFIELD, N. J.—See Page 62.

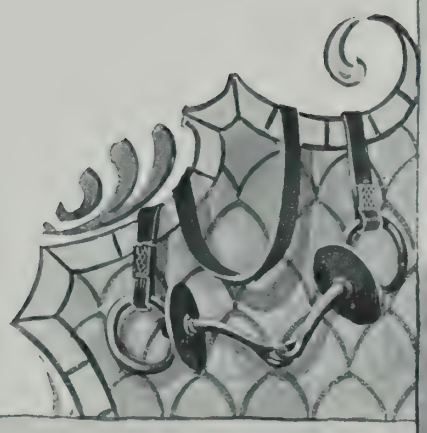
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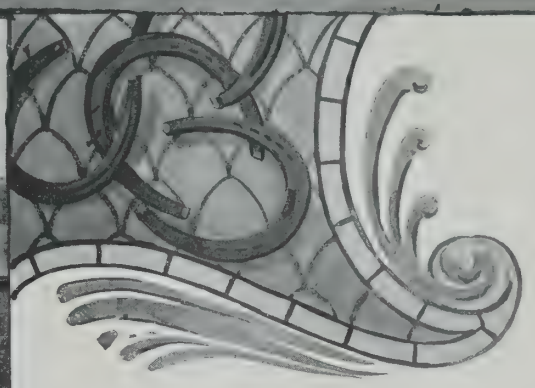


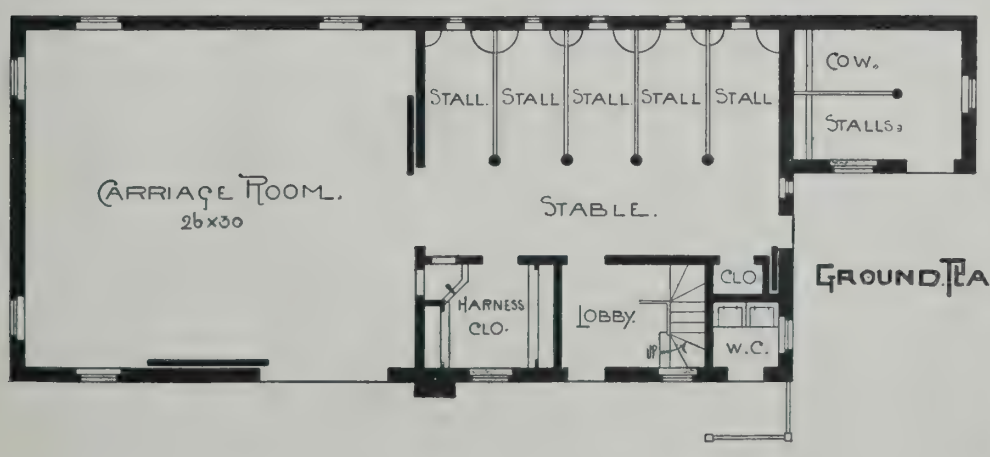
A DWELLING AT BELLE HAVEN, CONN.—See Page 69.









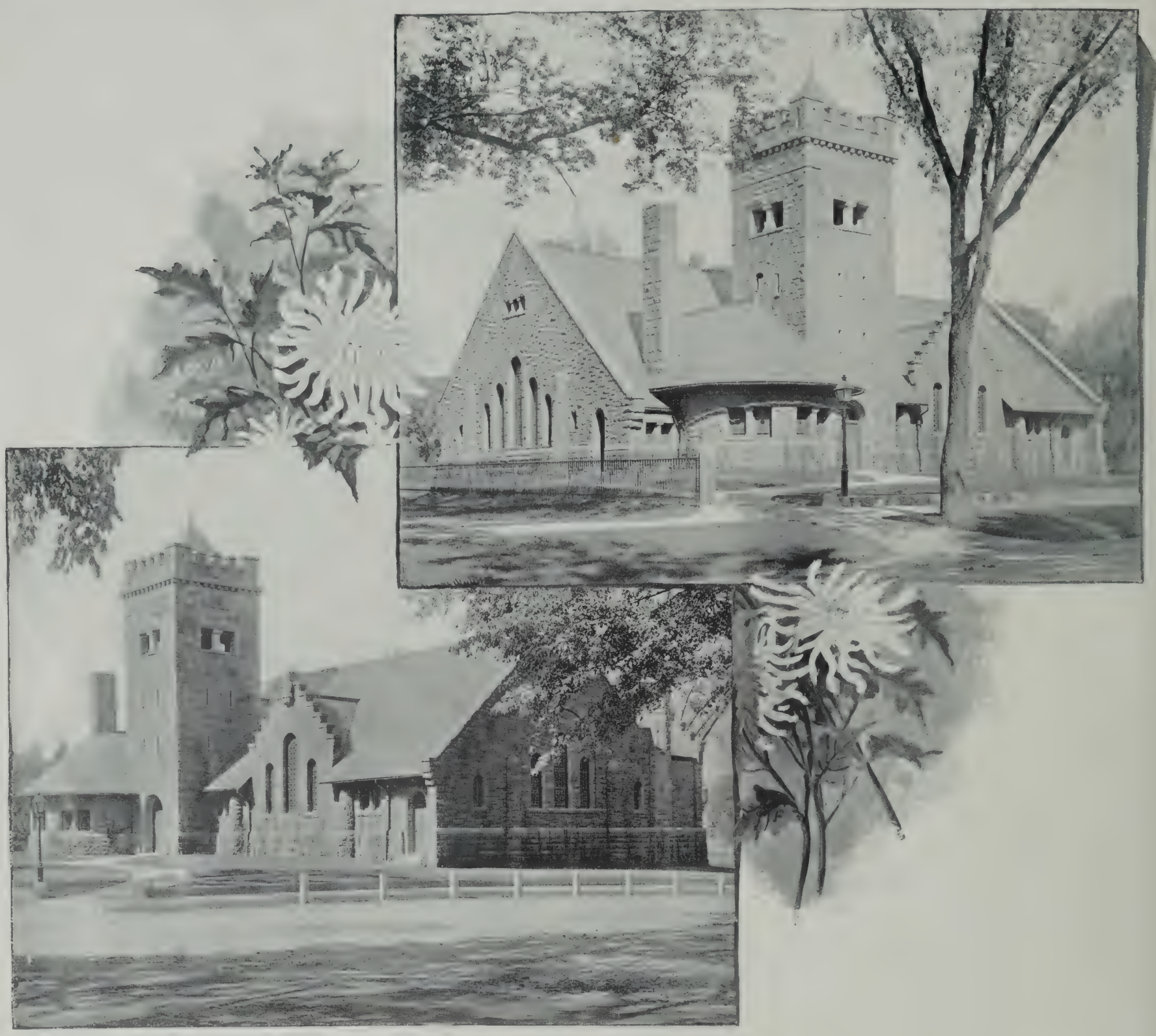


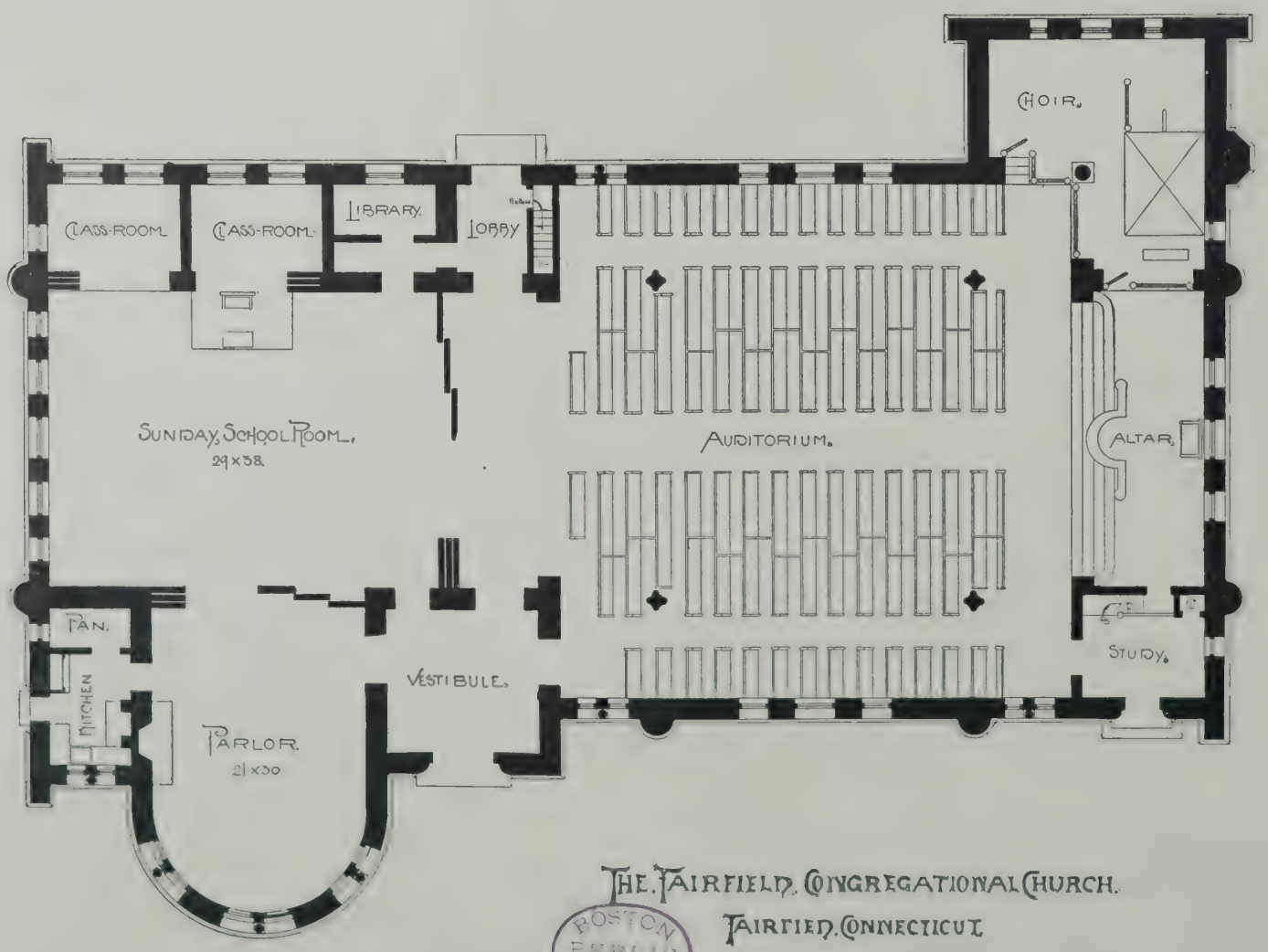


A STABLE AT PLAINFIELD, N. J.—See Page 69.

A STABLE AT BRIDGEPORT, CONN.—See Page 69.

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THE FAIRFIELD CONGREGATIONAL CHURCH.
FAIRFIELD, CONNECTICUT.

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THE FAIRFIELD CONGREGATIONAL CHURCH, FAIRFIELD, CONN.

During two and a half centuries the Congregationalists of Fairfield, Conn., have had five different churches, all of which have been burned; the third church was burned by the British on July 8, 1779. The first church was built in 1639, and it was constructed of rough logs and hewn timbers, the crevices being filled in with clay; openings cut in the timber to admit light, and the door being simply a barricade without hinges. The people sat on stones, blocks of wood, or whatever they might bring with them for a seat. This rude structure is quite in contrast with the grand, stately, expensive pile in which the people now worship. The sixth church, of which we present illustrations on page 68, has just been completed, through the untiring efforts of its Rector, the Rev. Frank S. Childs, who has the honor of being instrumental in setting in motion the machinery which has been the means of materializing one of the finest places of worship in the State. Mr. Childs was assisted by Frederick Sturges, Esq., who is entitled to much credit for his kind attention during the progress of the works. The new building, of great architectural beauty, is treated in the English Gothic style. It is situated on a gentle rising knoll some distance from the road, thus giving ample opportunity for effective surroundings, and keeping it in harmony with its location, and the ancient spreading elms, the glory of Fairfield, which serve to add their beauty, and thus render the scene attractive. The exterior walls are built of a warm reddish sandstone. The roof is covered with red English tiles. The main entrance is marked by the tower, which is unusually ample in dimensions, and through which we enter a large vestibule, giving access to the whole church. The side walls of this vestibule are paneled to the ceiling with oak, and the ceiling heavily timbered and paneled in keeping with the walls. The floor is of polished marble mosaic. On entering the auditorium, four great columns, so disposed as not to obstruct the vision, are seen, having elaborately carved capitals, and from which spring heavily moulded arches, laterally and diagonally, finally losing themselves on carved corbels against the walls. In the central space, inclosed by these columns, above, the arches are a maze of curiously fashioned braces and arches, worked in all, however, with scientific regard to the work they have to do, and, with their rich crowns, making a warm, cheerful interior. The pulpit recess is separated by a broad soffited arch, and is elevated above the auditorium floor some five steps, which extend entirely across the space inclosed by the pulpit arch, and only broken by the bronze pulpit located in the centre. At the left of the altar, and in no way obtruding itself, is the organ and choir, re-enforcing in a very dignified manner the pulpit end, one arch to the recess being effectively located on each side, with a great stone column between, having carved and moulded capital and base. On the side opposite the organ the space is occupied by another entrance vestibule, a study, which affords access to the altar. The pews, furniture, and woodwork throughout is of old English oak, harmonizing with the Indian red furnishings, the delicate stained glass effects, and the walls, which are treated in yellow and brown. The auditorium has a paneled wainscoting six feet in height. At the rear of the church, opposite the chancel and in a recess corresponding with it, appear great sliding doors, which separate the schoolroom from the church proper, when occasion demands, or allowing it to become a part of the auditorium, a feature which has proven quite satisfactory. The schoolroom is well lighted, and trimmed with whitewood, finished natural. It has two classrooms, separated by sliding glass doors. The parlor is separated from schoolroom in a similar manner. It is painted China white, and the walls and ceiling are treated in an exquisite manner with two shades of Colonial yellow and pale green. The fireplace has a hearth and facings of tiles and a wood mantel. Kitchen is furnished replete. Cemented cellar contains furnace and other apartments. The cost of the building was $52,000; furniture, bell, and organ cost $10,000 more. J. Pierpont Morgan, of New York, donated the bell and organ. Messrs. J. C. Cady & Co., architects, New York City, N. Y.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A STABLE AT PLAINFIELD, NEW JERSEY.

We publish on page 67 a model design for a stable, which has been erected for W. B. Wadworth, Esq., at Plainfield, New Jersey. The building is erected in the most substantial manner and of the best quality of materials. It is built of part brick and wood, the brickwork being built of Haverill brick laid up in red mortar, and the woodwork covered with shingles and stained sienna with bottle-green trimmings. Roof shingled. Size of building, 28 x 60 ft., with an extension of 12 x 14 ft. The interior throughout is ceiled up with narrow beaded yellow pine and finished natural. The floor is concreted to a thickness of two feet, making it much more cleanly than an ordinary wood floor. The carriage room, well lighted, contains a carriage wash and drain. The stable is well lighted and ventilated, and it contains five stalls, which are provided with the usual ornamental iron trimmings and furnished with the usual fixtures, etc. The harness closet is provided with shelves and hooks, inclosed with sliding glass doors. The stairway in lobby leads to man's bedroom on second floor. The second floor also contains ample room for storage. The extension is provided with two cow stalls. Messrs. Hartwell & Richardson, architects, Boston, Mass.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.



A BUILDER'S SHOP.

A PACIFIC COAST BATHING ESTABLISHMENT.—A bathhouse that Mr. Adolph Sutro is having built on the harbor shore, near San Francisco, gives promise of being one of the wonders of the Pacific Coast, so vast is the scale of construction. It is situated in a natural cove into which sweeps the line of surf. To break its onset, and protect the building, a massive sea wall has been built. On the inner side of it is an enclosure with a capacity of 1,000,000 gallons of water, and adjacent to this are six apartments, or bathing tanks, which are to be filled from the large reservoir with water at various temperatures, to suit the bathers. No pumping will be necessary, the flow from the ocean being continuous by reason of the conformation of the cove, which is that of a horseshoe. In the calmest weather all the tanks can be filled in fifty minutes. The waste water is carried by pipes far out to sea. Back of the baths, tiers of seats are to be raised for the accommodation of thousands of spectators. The dressing-rooms, 400 in number, will be under the seats and on five different floors. They are to be handsomely finished and thoroughly equipped.

A STABLE AT BRIDGEPORT, CONN.

The engraving, page 67, shows a design for a modern stable, recently completed for Frederick Banks, Esq., on Clinton Avenue, Bridgeport, Conn. The design is excellent and the arrangement complete. It has a footing of stone and underpinning of brick. The exterior framework is clapboarded and painted olive-yellow with brown trimmings. The gables and dormer windows are shingled and painted similar. Roof covered with octagonal cut slates. Dimensions: Front, 38 ft. 6 in.; side, 31 ft. The interior throughout is ceiled up with narrow beaded yellow pine, finished natural with hard oil. Carriage room, 22 ft. x 30 ft., is well lighted, and provided with carriage wash, chimney, and stairway to second floor. Stable contains two stalls and box stall, furnished with the usual ornamental iron trimmings and fixtures, and a harness closet fitted up replete. The stable floor is concreted. Second floor contains man's bedroom and storage, the former being plastered and finished complete. Messrs. Longstaff & Hurd, architects, Sanford Building, Bridgeport, Conn.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A DWELLING AT BELLE HAVEN, CONN.

We present on page 66 a dwelling of unique design, which has been erected for H. H. Mitchells, Esq., at Belle Haven, Conn. The design has many pleasing features, including tower, bay window, chimneys, and the shaded piazzas. The underpinning and chimney at first story are built of "rock-faced" field stone, laid up at random. The building above, of wood, is sheathed on the exterior, and then covered with shingles, left natural, with white trimmings. Roof shingled. Dimensions: Front, 44 ft.; side, 31 ft., not including rear lobby or piazza. Height of ceilings: Cellar, 8 ft.; first story, 9 ft. 6 in.; second, 8 ft. 6 in.; third, 8 ft. The interior arrangement is most complete. The broad, low staircase, paneled divan, and fireplace are the features of the hall while the old casement window effect in reception and dining-room is in keeping with the several spindle transoms. These casement windows on first story have transoms glazed with delicate tinted glass, shedding a pleasant light over the various apartments. The hall and reception room are separated by fluted columns with carved capitals, extending to ceiling and supporting a spindle transom. The space between columns and partition is also filled in with spindlework. Parlor is treated in cream enamel, and the hall, dining-room, and bathroom are trimmed with ash, finished in old oak, while the remainder of the building is trimmed with white pine; some finished in ivory white and the remainder finished natural. The staircase has a carved newel and spindle balusters. The fireplace in hall is built of Tiffany brick, with facings and hearths of same. The fireplaces elsewhere have tiled hearths and facings, and mantels from special design. Butler's pantry is trimmed with ash, and is provided with bowl, dresser, and closets complete. Kitchen is wainscoted, and provided with dresser, closet, sink, lobby large enough to admit icebox, and stairway to cellar and second floor. Second floor contains a pleasant nook, three bedrooms, large closets, and bathroom, the latter wainscoted and furnished in the best possible manner. Two bedrooms and storeroom on third floor. The cemented cellar contains laundry, furnace, and other necessary apartments. The house is fully plumbed and heated by a hot air furnace. Cost $6,000 complete. Mr. Frank W. Beall, architect, 318 Broadway, New York City, N. Y.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A BUILDER'S SHOP.

We give from *La Semaine des Constructeurs* a view of a tasteful shop for a builder, erected on Avenue de Nevilly, Paris, and designed by M. P. Sédille, architect. We call it a shop for a builder; but, of course, it may be used for any desired purpose. In fact, it contains suggestions from which a tasteful dwelling might be developed.

[*Continued from April number.*]

The Fifth Avenue Theatre,

NEW YORK CITY.

By HENRY M. STEVENS.

The Fireproof Cement.

Another adjunct to the fireproof construction of the theatre is the fireproof cement.

With all the march of invention and improvement in every line, there has been, until recently, no improvement made in the constituency of plastering mortar. Lime, sand and hair seemed to be the only things taken into consideration as worthy of the mixture.

Under the old system of lime and hair plastering, this branch of the building trade is notoriously the poorest portion of buildings, and a good specimen of wall plastering is the exception. Walls are easily broken, and patching and repairing has been the rule; not to mention the frequent falling of ceilings and the dangers incident thereto. Falling ceilings occur so frequently that the authorities of many of our cities have prohibited the use of plastering in school-houses, court-houses and other public buildings, and substituted metal and wooden ceilings.

The causes of these well-known defects are not so hard to find: varying qualities of different limes, poor sand, rotten hair (due to chemicals used in preparing). Some of the faults and difficulties in applying the lime and hair mortar are: the large amount of water necessary must injure the woodwork, the shrinkage will be uneven, and badly cracked walls will be the result, and the time taken in seasoning and getting ready for the hard finish.

These matters were carefully looked into by the architect, and the result was that "King's Windsor Asbestos Cement" was used for plastering the walls and ceilings, because it was found that this material not only obviated all of the objections to the use of lime and hair, but was over 300 per cent. stronger and 200 per cent. harder without losing any of its elasticity, and as a material to decorate over has no superior. The occupation of the theatre was, no doubt, hastened by a number of weeks because of the use of this cement. Its fireproof qualities speak largely in its favor for similar work.

The Harkness Automatic Sprinklers.

In addition to all the precautions taken in the employment of fireproof materials to preclude the possibility of fire taking place in any part of the stage portion, the starting point of nearly all the fires in theatres, there are means provided by which fire may be instantly quenched in the shape of automatic sprinklers, so placed as to control every foot of surface under and above the stage and in the dressing-rooms. For the quick removal of smoke, skylights working automatically are placed in the roof. There are 227 Harkness automatic sprinklers in all installed, distributed as follows: In the roof, 44; in the gridiron, 50; in the first and second galleries, 12 and 9 respectively; under the stage, 40, and in the dressing-rooms, 72.

The general construction of this remarkable apparatus is as follows: Water pipes conveying water, always under strong pressure, are arranged in all parts of the theatre, and projecting from the pipes are the automatic sprinkling devices, or heads, each of which is provided with a drop valve, which is held up in closed position by a lever and an interposed ball, which is arranged between one end of the lever and the valve. The other end of the lever is held up by means of fusible metal or solder. When a fire occurs in the vicinity of any one of these 227 sprinklers, the heat melts the solder, whereupon the lever and ball instantly drop and the water-pipe valve opens, causing a flood of water to issue, which is deflected by the valve in all directions over a circular area of ten or twenty feet. Almost every part of the theatre is thus covered and protected by these wonderful sprinklers, and if a fire should occur it would be deluged and extinguished with water before it could make serious headway.

The Harkness Sprinklers are used in thousands of establishments, and have been the means of saving millions of dollars' worth of property by their prompt and efficacious system of operation.

The Fire-Engine Apparatus.

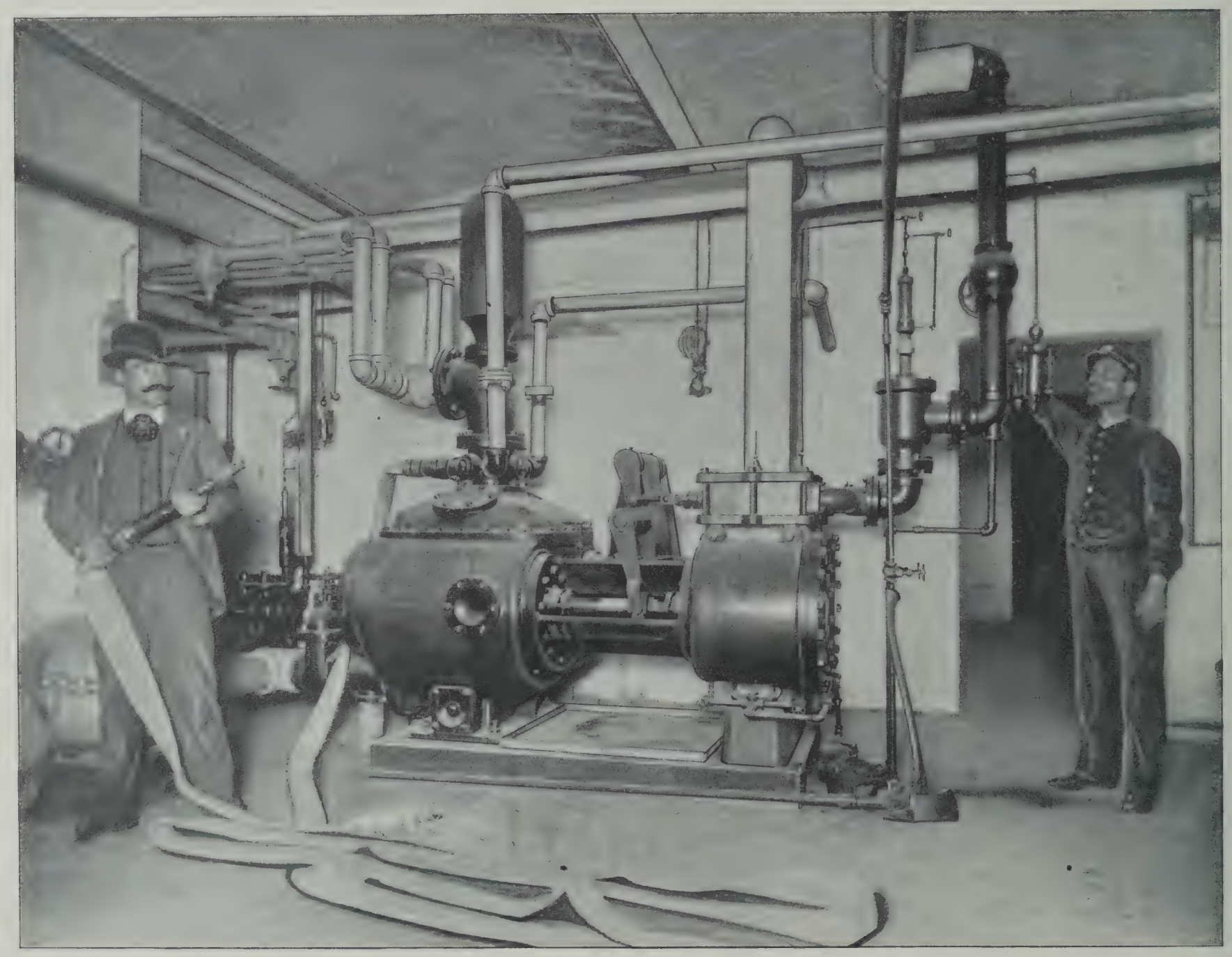
It is apposite that the entire fire engine apparatus should be mentioned at this point, while the subject of guarding the theatre from accident by fire is under discussion. The accompanying illustration of the Worthington Steam Fire Pump used in the "Fifth Avenue" makes a direct appeal to general regard, consequently, and after the original is examined it will be seen how superb a steam service has been provided for this splendidly equipped building.

To this special machinery beneath the stage, we must certainly accord the palm for superiority.

The pump is connected by a number of pipe lines with five fire stand-pipes, having a number of fire valves and fire hose. Two of these lines are located on each side of the auditorium, two on each side of the proscenium opening on the stage, and one on the corrider leading to the dressing-rooms.

The fire-pump also supplies water to the large tank located on the highest roof over the stage, which tank is for the exclusive purpose of feeding the automatic sprinkler system. Air and vacuum chambers are provided on the pump, the suction being connected with a six-inch Croton supply pipe and a large suction tank.

These features are most assuredly a question of importance to the public, which looks to protection from just such wise provision in an hour of danger.



THE WORTHINGTON STEAM FIRE ENGINE PUMPS,
AT THE FIFTH AVENUE THEATRE, NEW YORK.

The pump is composition fitted throughout, and in its construction is embodied the well-known Worthington duplex valve motion—the result of fifty years' experience in the manufacture of this class of machinery.

The piston rods and valves of Tobin bronze are extra heavy, and the stuffing boxes are lined with composition.

There are three tanks. One is a 6,000 gallon wooden tank, for the automatic sprinkler system, before detailed; another, on the level of the rigging loft, is of iron, and intended to supply the house plumbing; and the third one, also of iron, is located in the basement, and supplied from Croton pressure by means of two two-inch ball cocks.

The house pump, like the fire pump, when filling the fire tank, always draws from a receiving tank supplied directly from the city mains. This reservoir, acting as a suction tank for the pumps, has a capacity of 1,000 gallons.

In case of fire, a valve on the direct Croton supply will be opened, and thus the house pump will draw directly from the 6-inch main.

The 3-inch overflow from the suction tank discharges into a sink, the waste from which is trapped and connected with the sewer. The overflow pipe of the cold-

water house tank is of galvanized wrought iron, and runs to the nearest roof gutter. This tank has a 1½-inch sediment valve and blow-off pipe, and is fitted with a cut off connected with the house pump, to automatically start the pump when the water in the tank is drawn down.

The valve areas and water passages of the fire-pump are unusually large, to insure the complete filling of the pump cylinders with water, when the machine is running at its greatest speed.

The superiority of the Worthington valve motion is especially prominent in the steam pump applied to fire service, for it enables the pump to run without jar or danger of derangement, at the very high rate of speed that is sometimes required.

With all forms of single cylinder pumps, under such circumstances, the concussion of the water valves, at each reciprocation of the plunger, and the blow upon the valve rod tappets, are dangerously severe, and render the machine and water pipes liable to fracture. To obviate this difficulty as far as possible, the length of stroke is often unduly increased to reduce the number of these concussions in a given length of piston travel. It fixes, however, at a point that can be greatly exceeded by the Worthington, the practical limit of speed at which single pumps can be driven. There are no tappets in the valve motion of the Worthington pump. It neither strikes a blow nor operates suddenly upon the plunger. The piston cushions quietly upon steam at the end of the stroke, pauses for an instant until the water valves have closed, and then starts on the return stroke gradually, as its steam valve is opened by the motion of the opposite piston.

The Worthington pump, the pioneer of its type, was invented and patented by the late Henry R. Worthington in 1844. When he first established the works Mr. Worthington had but one small factory, where he, with two or three machinists, constructed the few pumps that made up the limit of his sales.

Gradually, from this insignificant beginning, the works and force were enlarged, until to-day the buildings cover two city blocks and employment is given to a force of from 1,000 to 1,200 men, depending upon the condition of trade.

In the Chicago Auditorium there are twenty-one Worthington engines, having an aggregate capacity of nearly 20,000,000 gallons per day; while those in the Equitable Building in this city have a capacity of 9,000,000 gallons; those in the Produce Exchange Building have 9,000,000 gallons; those in the *World* Building, from 4,000,000 to 5,000,000 gallons; and those in the Union Trust Company's Building, 3,000,000 gallons in twenty-four hours.

Of course, water works engines are only one department of pumping machinery, and as the firm of Henry R. Worthington has thousands of smaller pumps at work for all purposes, and also for serving petroleum pipe lines, working hydraulic elevators and feeding boilers, the variety offered can well be surmised.

In a building like The Central, at West and Liberty streets, the Worthington pumps supply enough water for the use of a town of 35,000 people. In Paris, the Worthington engines used in the Eiffel Tower during the Exposition, to carry the water to the high level of 918 feet for the hydraulic elevator service, permitted thousands to test the advantages of that wonderful tower and the capacity of American engines at the same time. At the World's Columbian Exposition, Chicago, the Worthington Pumps are used, and the Worthington exhibit is one of the most prominent of all the mechanical wonders there presented to view.

The uninterrupted growth of the business of the firm of Henry R. Worthington is due not only to the inherent excellence of the duplex type of engine, but to a continued effort on the part of those having control of the business to follow the conservative views and practice of the founder of the firm, and to combine with the best character of workmanship only such designs and methods of construction as have stood a thorough and practical test, believing that it is best to avoid such complications and refinements, either in construction or practice, as involve increased liability of derangement, and to keep upon a safe and easily maintainable plane of performance, rather than to seek for superlative results by introducing elements of uncertainty or danger. As an evidence of the wisdom of such a course is the fact that the pumps made by this firm are in use all the world over where steam and steam engines are built or used.

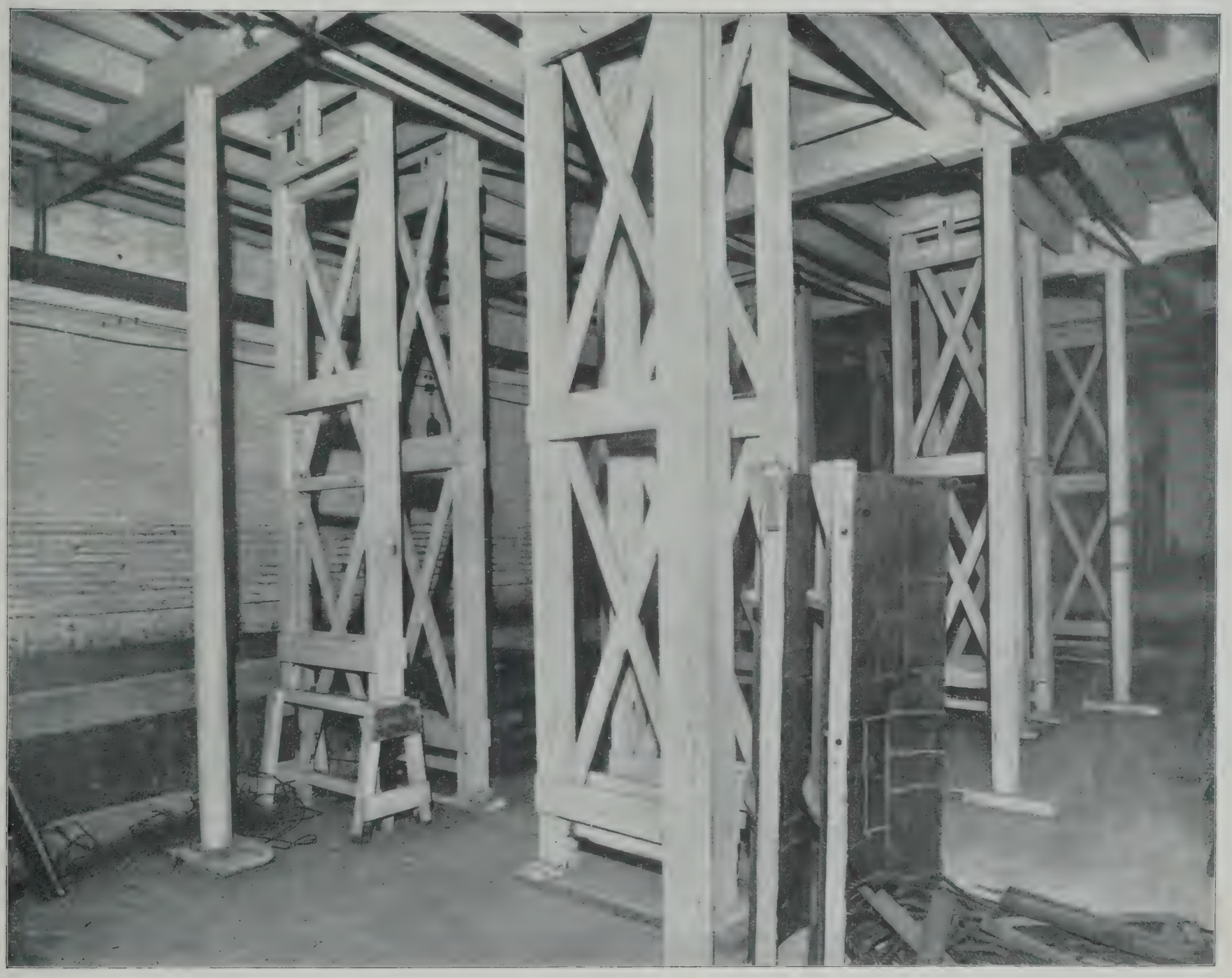
Although the present hydraulic works, which were originally established in 1845, occupy two city blocks in Brooklyn, and employ over 1,000 men, yet it has been found necessary to extend the plant, and a large branch foundry at Elizabethport, near the Singer Sewing Machine Manufacturing Company, on the line of the Central Railroad of New Jersey, is being constructed. It will be complete with all the latest improvements.

THE WATER-TIGHT SCENE-PIT.

"The Hygienic Cement and Asphalt Company," of which Mr. Samuel Tebbutt, of this city, is the representative, has accomplished in the water-tight scene-pit beneath the stage a problem of which it has every reason to be proud. There are still certain parts of the city where, owing to the nature of the subsoil, a basement is likely to be subject to inundations of water, demanding the services of a pumping engine to check their destructive effect. In nearly every other theatre than the Fifth Avenue, artificial means, such as gas engines, hydraulic pumps and siphons, have to be resorted to, involving considerable annual outlay in order to keep basements and scene-pits free from water, as well as to protect the scenery from injury, which is peculiarly susceptible to dampness. The lessee of the Fifth Avenue, therefore, may congratulate himself on his exemption from any inconvenience, injury and loss from such a source as a damp basement by the possession of an absolutely water-tight scene-pit.

The pit thus made waterproof is twenty-eight feet below the ground line. Difficulties of an exceptional character had to be surmounted in rendering it impervious, as no less than eight vigorous springs contended for supremacy in this particular spot. The method adopted comprises the use of asphalt slabs, constructed in such a manner as to form on the back surface a "key" by which they are attached to the solid masonry, so that no amount of water pressure can ever separate them from their fastenings. The method, as applied here, too, was used for the first time in this country, and has proved so effective and satisfactory that patents have been applied for to secure to the company the emoluments of its experiments and enterprise.

Hot asphalt is poured in a mould on a layer of broken stone, gravel, cinders, or the like, in such a way that the same shall become a part of the plate, or slab, when set and cold, and yet leave the interstices, or spaces, between the said pieces of stone or gravel, forming on the under-



THE HYGIENIC CEMENT AND ASPHALT COMPANY'S WATER-TIGHT SCENE-PIT,
AT THE FIFTH AVENUE THEATRE, NEW YORK.

side thereof a honeycomb, or "key." The object is, that when the said plate or slab shall be placed in position on a surface freshly covered with Portland (or other) cement, the slab, or plate, may be embedded therein, and the cement forcing itself between the interstices or spaces shall cause the same to firmly adhere and to become in effect a solid structure.

An ingenious device in connection with the present plant at the Fifth Avenue Theatre is a pipe, reaching to a depth far beneath the asphalt flooring in this basement, and placed in a convenient corner of one of the rooms on that level, by which the exact height of the water line beneath the foundations may be gauged at discretion. The scene pit itself is just three and a half feet deep as seen beneath the stage in the view presented here.

Through the pipe just mentioned a measuring rod is passed, and the water level determined without either difficulty or loss of time.

The fly-galleries, basements and corridors of the theatre that have been laid with the hygienic cement of this company illustrate the special qualities of the agency employed there against all animal life—rodent as well as insect, together with all microbe germs—in a most invaluable way. The hygienic character of the concrete applied is due to the antiseptic ingredients used, which are proof against all noxious features of that class, and establish a precedent well worth considering wherever sanitary conditions have weight. Even the floors of the dressing-rooms are of this material, which is fireproof, in addition to its other advantages of cleanliness and durability.

THE ELECTRICAL SWITCHBOARD.

If we enter the theatre by the stage entrance, we find ourselves immediately upon the stage and confronting the electrical switchboard.

The switchboard at this theatre for controlling the auditorium and stage electric lighting is perhaps the most complete apparatus of its kind ever constructed, as it embodies certain new and very desirable features. This board, with its apparatus, is entirely fireproof. The framework is of iron, on which is mounted the controlling apparatus, and the marbleized slate slab supporting the switches. These switches are so made, and connected electrically, as to permit of prearranging a lightning effect at leisure, and then, by means of a common switch, to produce the effect at any given instant. This is accomplished by having the principal lighting circuits supplied by either one or two bus circuits, which, in turn, are controlled by large gang switches. This arrangement is of great advantage when complicated lighting has to be done at short notice—as when a certain combination of lighting has to give way instantly to another new combination.

The regulating apparatus for raising and lowering the candle-power of the lamps is constructed on an entirely new principle, as the rheostat switches are placed together sidewise, so as to occupy the least space possible, while the regulating levers are made to be raised and lowered with the candle-power of the light. The handles themselves are at right angles with the levers, so that the operator can take hold of as many as four handles at one time with his two hands, and in this way he accomplishes what it usually takes complicated mechanism to do.

All the important circuits are controlled by separate rheostats, which are probably the first ever built on the three-wire system, having separate resistances and contacts for both positive and negative sides.

All the wire connections behind the board are thoroughly accessible, with no attempt at concealment—which practice is now considered by experts to be the latest and most desirable.

The smaller switches on the board are on the new Johnson vice principle, which gives great current capacity in a minimum space. The rheostat switches, gang switches, and main switches, as well as the improved incombustible and waterproof stage receptacles, were designed by Mr. J. Van Vleck, of the General Electric Company, New York.

The illustration presented of this switchboard will afford a good idea of its arrangement.

THE ORNAMENTAL BRICKWORK.

The light colored brickwork used in the Twenty-eighth Street front of the new theatre, and which is technically called "old gold front brick" by the manufacturers, the Sayre & Fisher Co., emphasizes the growing demand for an attractive building material, that will prove durable, fireproof, and have a pleasing variety of color; for by combining attractive colored bricks in building, an architect is enabled to produce an effect decidedly superior to the monotonous uniformity of conventional methods. Red brick and brownstone have had their day.

Hard, well-burned brick forms the very best fire-resisting material known. Stone, brought in contact with intense heat, crumbles and falls; marble is quickly reduced to lime; even iron will twist and crack at times; but a brick wall remains strong and entire, as many disastrous fires in our great cities prove.

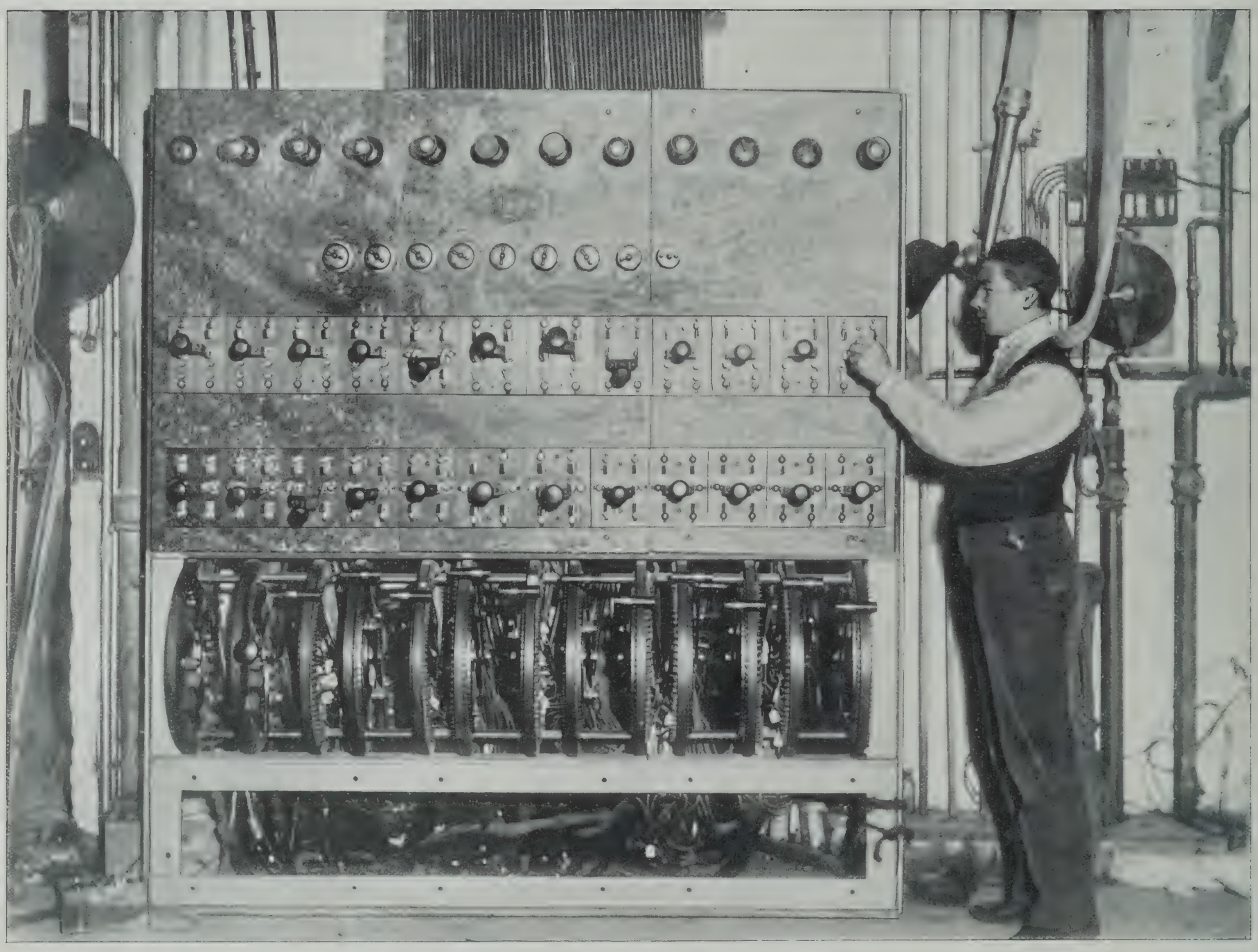
For these reasons many architects and builders regard brick as the best material for permanent buildings. The question is often asked, How shall we determine on the best bricks for building purposes?

First, they should be hard and strong, have a metallic sound when struck, not absorb too much moisture, and have clean, square edges, free from cracks and flaws. Such bricks are practically indestructible.

Architects should carefully inspect all front brick submitted to them for use in their buildings. Many of this class, often distributed among them as samples, will (owing to the mode of manufacture) absorb moisture very rapidly, and tend to produce damp walls. Such, if not allowed to get thoroughly wet previous to laying up, must when placed on the face of a wall—especially in warm weather—absorb too much moisture from mortar, leaving it dry and weak, like so much sand, producing a very imperfect bond, and causing the mortar joints to soon fall out. Architects can readily test such samples submitted by an application of water. These will absorb moisture almost as rapidly as it is applied. From the appearance of many of these samples, too, one would not suspect their porous nature; but, as has been said, the water test is a sure sign of weakness in this respect.

It is not to be expected, however, that all these points are to be found, except where such long experience and skill as have been closely identified with the Sayre & Fisher Co. during the past thirty years are likely to exhibit them in its special manufacture. Having access to some of the best clays in the country, this company has been successful in meeting the demand for various colors and styles of brick to such an extent that it has produced such varieties as light or dark buff, ochre, red, drab, gray, old gold, bronze and mottled brick. The Roman or Pompeian style has been, among others, supplied to the market by the company, and special shapes and sizes, now very popular among our leading architects, are manufactured as required.

With works at Sayreville, on the Raritan River, near



THE GENERAL ELECTRIC COMPANY'S SWITCHBOARD,

AT THE FIFTH AVENUE THEATRE, NEW YORK.

South Amboy, the company, owing to this location, is enabled to load vessels drawing thirteen feet of water, and to secure cheap transportation of its products to all points upon the coast, as well as those reached by the canal systems of New York and Pennsylvania. The proximity of the works to New York gives the means of prompt and cheap delivery to all the receiving wharves of the competing lines of railroads in that vicinity. There are also facilities for loading on cars direct from its works.

The company also manufactures large quantities of hard building bricks, and produces over 60,000,000 of them annually. In the Central Building, at West and Liberty streets, are to be found over 500,000 front bricks furnished by the Sayre & Fisher Company, while other prominent contracts, in which large amounts have also been a feature are, the "Casa Alameda," the new hotel in course of erection on the Boulevard, 63d street and Columbus avenue; the "Colonial Club," at 72d street and the Boulevard, and the Sherman Hotel, at 71st street and the Boulevard; Railroad Men's Building, Madison avenue, corner 45th street, New York, R. H. Robertson, architect, mottled brick, Roman size; Progress Club, 5th avenue, corner 63d street, New York, A. Zucker & Co., architects, special red brick; Interior of (new) New York Aqueduct Pump House, New York City, in buff; Manhattan Athletic Club, Madison avenue, corner 45th street, New York, P. J. Lauritzen, architect, light gray brick.

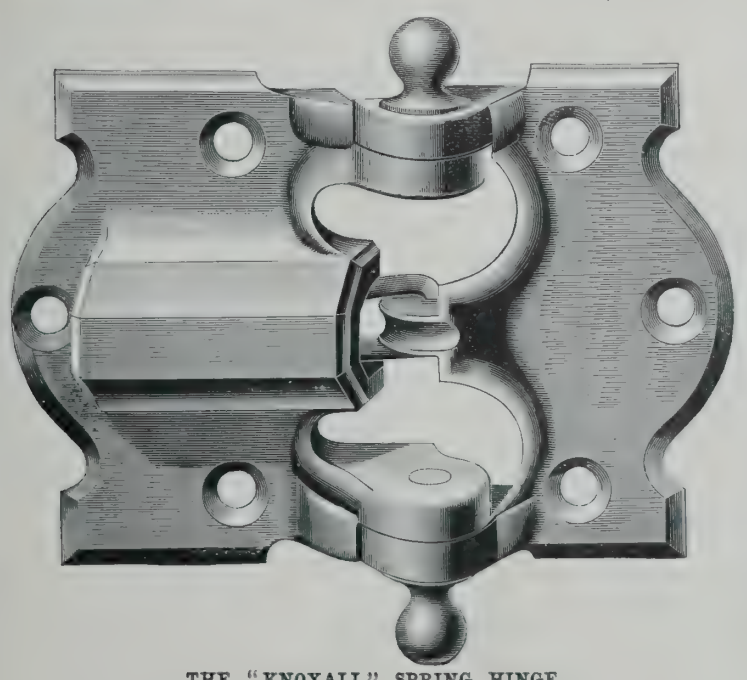
(To be continued.)

MESSRS. RUSSEL WHEELER & SON, of Utica, N. Y., have just issued a neat little pamphlet entitled "A Talk on Hot Water Heating," which it would be well for all interested to write for. It is the intention of the book to answer practical questions touching both the hygienic and financial sides of the house-heating problem.

AN IMPROVED SPRING HINGE.

The name adopted for this new style of spring hinge suggests, with colloquial forcibleness, the merit that is claimed for it in comparison with all other spring hinges. Its neat, symmetrical appearance, and the simplicity of its construction, will also insure for it the careful consideration of builders and others interested. It is of the holdback type, and will close a door or allow it to remain open, as desired.

The hinge is cast in two pieces only. These, with a direct-acting spring made of fine crucible steel carefully tempered, and the connecting link, four pieces in all, make the complete hinge. The spring is inclosed in a chamber formed in one of the flanges of the hinge, and is entirely covered and concealed, a feature that will be appreciated by every one who has used spring hinges. It is designed for use on screen doors, and is manufactured by the Van Wagoner & Williams Company, of 14 Warren Street, New York, and Cleveland, Ohio.



THE "KNOXALL" SPRING HINGE.

THE LEWIS OPEN FIRE BASE BURNER.

This burner presents many advantages over the old style straight flue fireplaces, as it not only thoroughly warms the apartments, but affords protection from soot and ashes, and provides a perfect ventilation. It also burns much less fuel, giving satisfaction with soft and hard coal alike.



THE LEWIS IRON MANTEL WITH SLATE SHELF.

The regulation of the fire is easily effected to obtain the desired degree of temperature. This construction is of cast-iron, securely bolted together, greatly facilitating handling and setting. The manufacturers of this burner, The Lewis Grate and Mantel Co., of 552 and 554 West Sixth Street, Cincinnati, Ohio, also manufacture a variety of iron mantels to fit, one of which is shown in the accompanying illustration. It has statuary tile setting in frieze and pilasters, independent heads in brackets and corners, statuary tile setting in summer front, brass mountings for frame and fender. The goods are really much handsomer than one would judge them to be from the illustration. These mantels and burners may be readily substituted for less satisfactory ones now in use in houses which have been standing many years. Those interested in such improvements should send for the company's catalogue.

THE Victoria railroad bridge over the St. Lawrence at Montreal is two miles long, cost over $5,000,000, and contains 10,500 tons of iron and 3,000,000 cubic feet of masonry.

The J. A. Fay & Egan Company.

The above is the style of a new company, a combination of two of the largest firms manufacturing wood-working machinery in the country. The new organization went into effect March 1. Thomas P. Egan, the president of the new company, says: "In regard to the two concerns, they manufacture one-half the wood-working machinery of the United States, and are the only concerns in the United States that can fit out a wood-working establishment entire with machinery of their own manufacture. They can supply any establishment, from a carpenter shop to a navy-yard, from the smallest wood-working establishment to the largest railroad or car-shop, with an entire outfit. They occupy squares on the opposite sides of the street, and are especially well fitted for being united under one management. We expect to be able to sell machinery just as cheap as ever, and to give more attention to its perfect construction, and still make as much money or even more than in the past. I have always given close attention to the construction and excellence of the manufactures of our company, and shall continue this under the new arrangement, and with a corps of trained mechanics and draughtsmen, all under expert supervision, no other company in the world will be better able to attend the wants of the wood-working industries as well as the new company. My aim in working the two companies under one management will not be to stand still, but to push on to greater triumphs than either has won in the past."

The H. W. Johns Paints, Etc.

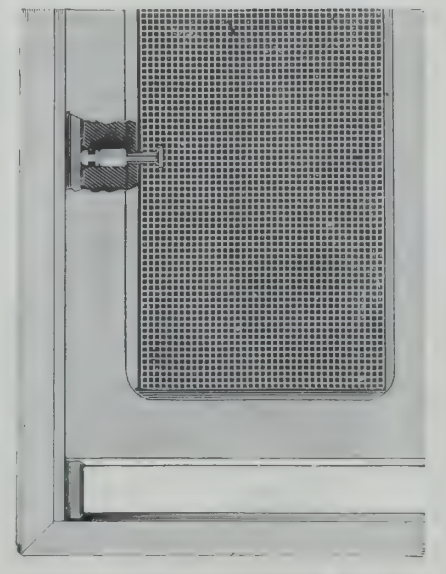
A neat publication is the Color Card of The H. W. Johns Mfg. Co., of New York, a sixteen page pamphlet, containing samples of the H. W. Johns Liquid Paints, Wood Stains, Fillers, Varnishes, Colors in Oil, Coach Colors Fireproof Paints for factories, smoke-stacks, etc. They have added a number of new shades in light tints to their House Paints, and the list of colors must now satisfy the most fastidious taste. This Company also issues a "Pamphlet of Suggestions for Exterior Decoration," which is very helpful to householders in the selection of colors suited to the architecture and surroundings of their houses, and producing harmonious combinations. They also furnish special combinations prepared by an expert for individual requirements. Heretofore these Liquid Paints have been put up only in pint or larger packages, but this year small strip cans are furnished for domestic use at 15 cents each for regular shades. A Liquid Wood Stain which is a combined Filler and Stain, and a Liquid Wood Filler which is also a good "knot killer" and shellac substitute, have been added, so that both the Stains and Fillers are now supplied ready for use as well as in the paste form.

THE Beekman Salutary System of Sanitation in water closets affords the subject matter of one of the handsomest illustrated catalogues which has recently come under our notice. The system covers what is styled a "whirlpool" closet, so named as describing the rush and direction of current of the flushing current, and a "duplex" tank, arranged to give a second flushing through different channels, and especially directed for the cleaning of the discharge conduit. The improvement is being introduced by the Beekman Salutary System Company, 56 Beekman St., New York, and the Company will send catalogues to those interested who may apply therefor.

MAJOR'S CEMENTS are now known almost everywhere, and they have come into extended use for a great variety of purposes. There are differe t kinds of the cement, including one especially for rubber and another for leather work, and when properly applied they are said to make joints as strong as was the original unbroken fabric. They often come in "very handy" around the house or shop. A. Major's Cement Company, 237 William St., New York, are the manufacturers.

AN ADJUSTABLE SASH HOLDER.

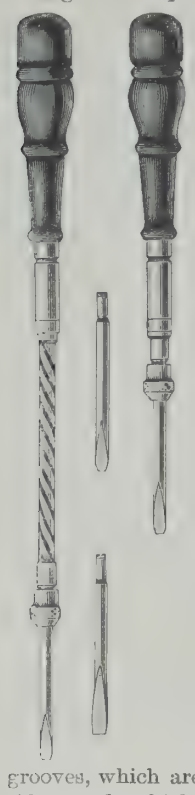
The device shown in the illustration, for holding sash, sliding screens, blinds, etc., in any desired position, is admirably adapted to work well under all conditions. It is adjustable to any pressure, from one heavy enough to answer as a lock to the lightest desired, the friction being regulated by a duplex screw-acting on the spring at either end. It is easily applied without nails, screws, or glue. The key or thumbnut may be dispensed with if desired, the price being one-fourth less without the thumbnut. This holder is manufactured by Peter Motley, of No. 750 South Broad Street, Philadelphia, Pa.



MOTLEY'S SASH AND SCREEN HOLDER.

A LABOR-SAVING SCREW DRIVER.

The "Howard-Allard" spiral, clutch, triple bit screw driver has recently been offered to the trade in new designs, though retaining all the original valuable features of the old Allard. This tool is especially adapted for light and rapid work, and is invaluable for mechanics having large quantities of small screws to drive. There is no turning of the hand and twisting of the wrist to drive a screw, which is effected by simply pushing the handle. The tool may be used as a spiral, ratchet, or ordinary screw driver. If it is found that a screw cannot be driven to its place by use of the spiral, it is readily done by using it as a ratchet or ordinary screw driver. It is provided with three bits, nicely finished, of different sizes, to enable the operator to select one to fit any size screw he may wish to use. These bits can be instantly interchanged and secured in the chuck or clutch provided for the purpose. The knurled nut of the clutch is made of steel, and the socket of steel, as is also the spindle, which is provided with four spiral grooves, which are cut deep and have square sides, and which nicely fit corresponding grooves in the extra long nut through which it passes into the handle. This gives it nearly four times the bearing surface to wear usually found in this class of tools, which have fewer spiral grooves and shorter nuts. The handle is made of thoroughly seasoned hardwood, nicely finished. The whole tool is not only attractive, but also very strong and durable.

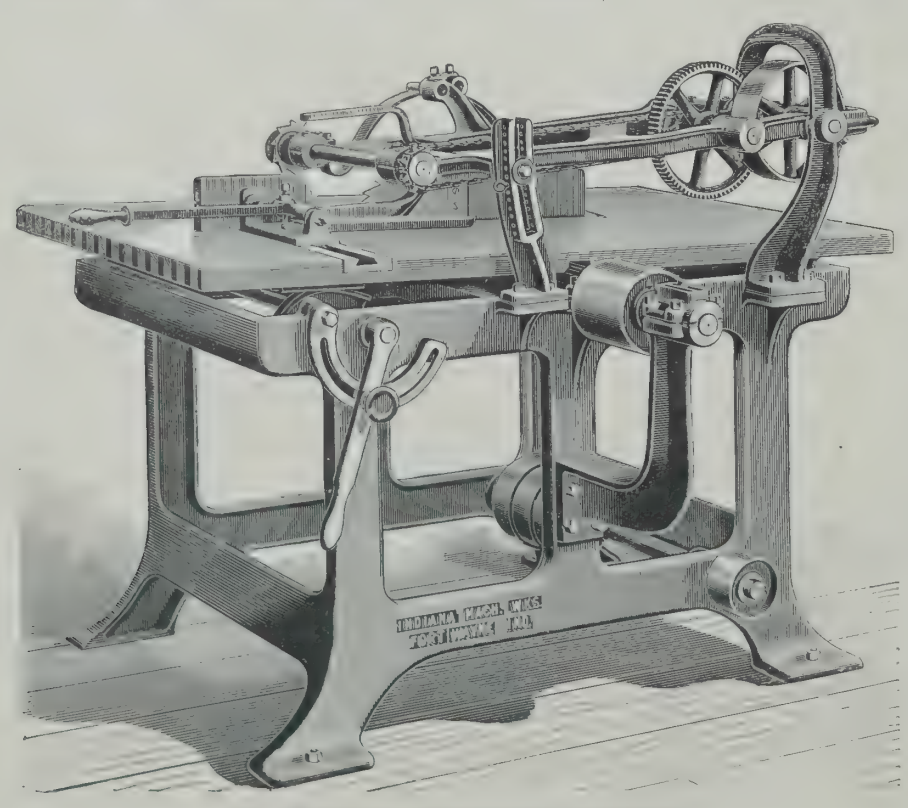


The implement is manufactured solely for the Alford & Berkele Company, 77 Chambers Street, New York City.

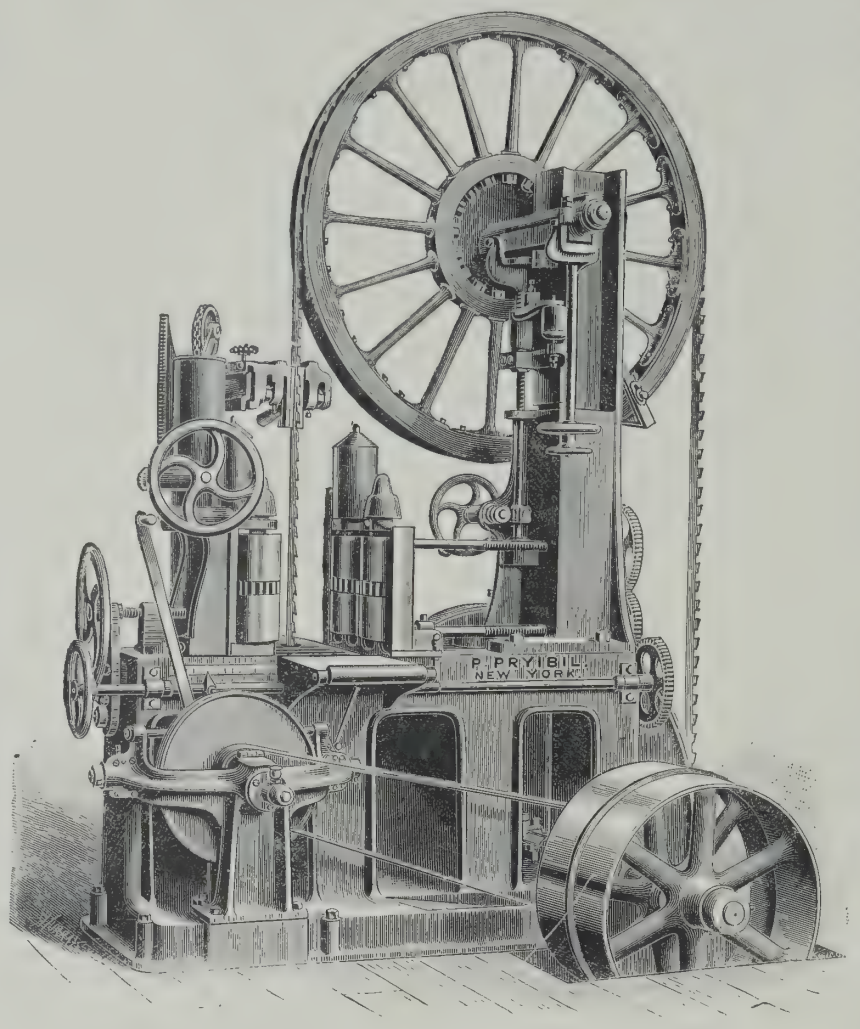
A SELF-FEED RIP SAW.

The saw shown in the illustration is intended to take the place of the hand-feed machine in planing mills, sash and door, furniture factories, etc., greatly increasing the product of any establishment where it may be placed. It has a substantial iron frame, cast in one piece; the arbor is large and of special steel, runs in self-oiling boxes, and has three bearings; the arbor is so arranged that several saws may be used at one time, if desired. The feed is strong, and is derived direct from the arbor, so as to be governed by the speed thereof at all times; the feed is a spur wheel made of steel, and arranged over the piece being ripped and in line with the saw. The feeding spur and frame can be raised and lowered to suit the thickness of material, or entirely thrown out of the way when it is desired to use the machine as an ordinary ripping saw. The table has a perpendicular movement of 5 inches, and always presents a level surface to the work. The saw can be taken out without raising the table. The table has two friction rolls, one each before and after the saw. A spring hold-down and shield is placed over the saw, which serves as a guard, and prevents accidents to the operator. There are three changes of feed, 60, 80 and 120 lineal feet per minute. Any size saw from 12 to 20 inches may be used. A 16-inch saw furnished with each machine. Size of pulley on arbor is 8x8 inches and should make 2,400 revolutions per minute. Weight, 1,200 pounds.

This machine is made by the Indiana Machine Works, Fort Wayne, Ind.



AN IMPROVED WOOD-WORKING MACHINE.



NEW SELF-CENTRING RESAWING BAND-SAW MACHINE.

NEW RESAWING BAND-SAW MACHINE.

This machine will use saws as thin as twenty-four gauge and up to six inches wide. It will saw 16,000 to 20,000 feet per day, making a kerf of only 1-20 of an inch or less, where most resaws make 3-32 to ⅛ more. The feeding is effected by four strongly geared live rolls, while two smaller idle rolls guide the last end of the stock up to the finish cut. Strong springs hold the rolls upon one side up to their work, and enable them to yield to all inequalities of thickness or shape, while the rolls upon the other side form a guide in perfect line with the saw, thus insuring a cut parallel with one side of the stock. A friction device, controlled by a single lever, enables the feed to be instantly stopped and started, or to be run at any speed desired without changing belts. With machines employing stop pulleys or gears for changing the feed, one speed may be just a little too much and the next one not near enough, resulting in decreased output. The saw runs between hardened steel plates, filled with dogwood plugs, with the end grain in contact with the saw, and each plate can be accurately adjusted by a single screw. The back of the saw has a bearing 1½ inches long on the beveled edge of a conical roller, of a special composition harder than steel. What little wear does occur takes place across the full width of the beveled surface, and, therefore, does not form grooves as would be the case with a plain roller. The upper guide is counterbalanced, and is adjustable, vertically, by a hand-wheel. This hand-wheel, the lever for controlling the feed, the hand-wheel for setting the feed rolls, and the scale showing to what thickness they are set, are all accessible from the sawyer's working position.

Height of machine, 10 feet 7 inches; width of machine, 7 feet 5 inches; depth of machine, 6 feet 6 inches; weight, complete, 7,000 pounds; diameter of wheel, 60 inches. Speed, 450 to 525 turns per minute, according to the kind and width of lumber. Thickness taken between feed rolls, 21 inches—12 inches on one side of the saw and 9 inches on the other. Height of stock that can be sawed off, 30 inches

For further particulars, write to the manufacturer, P. Pryibil, 507-519 West 41st Street, New York City.

Shipping a Factory Across the Atlantic.

On March 15th was loaded at New York the entire plant and equipment for an English factory for the Steel Clad Bath Company, of Detroit. The presses and rolling machines of different descriptions made here were consigned direct to the company there, and will be erected immediately on arrival under the superintendence of Mr. James Hutcheson, formerly of the Detroit Company.

Architectural Wood Turning.

Adam Dickey, 43 Bristol St., Boston, Mass., who succeeds the old firm of Anderson & Dickey, has added largely to the stock of turned and twisted Newels, Balusters, etc. He gives special attention to productions from architects' designs, and has sent work to many sections of the country. His catalogue shows a great variety of patterns which he carries in stock, and will be found of value to carpenters, stair builders, and all interested in building.

TUNNELING THE SIMPLON.—Work on the new Simplon tunnel has been commenced. When completed, it will be the longest tunnel in the world. It will extend from Brieg, in Switzerland, to Isella, in Italy, and its total length will be 12½ miles. It is expected that from eight to nine years will be occupied in the construction of the tunnel.

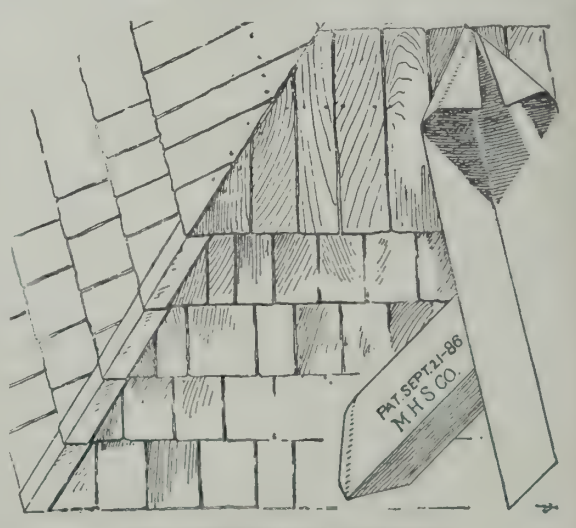
THE N. & G. TAYLOR CO., of Philadelphia, have opened a store and office in New York City, at No. 231 Water Street, where they will carry their special brands of Bright Tin, Roofing Tin, Solder, Galvanized Iron, and Tinners' Trimmings generally. This agency will be in charge of Mr. Benj. B. Morrison, a gentleman who is fully conversant with the trade in New York City and vicinity, having been in this line for many years.

The Wheeler Wood Filler.

The painter, the furniture manufacturer, and wood finishers generally, have a standard in the way of a wood filler, and that is the Wheeler Patent Wood Filler, manufactured by the Bridgeport Wood Finishing Co., New Milford, Conn. When, in February, the Master House Painters of the United States held their annual convention at Cleveland, O., they received a report on the merits of forty-two different kinds of varnish. This investigation into the merits of varnishes had been ordered more than a year ago, and every one of these forty-two different varnishes was tried over Wheeler's Patent Wood Filler.

AN IMPROVED HIP SHINGLE.

The shingles shown in the illustration have been largely introduced in the cities and larger towns of several of the Western States, and are meeting with a steadily increasing demand. They can readily be put on old roofs, making a clean cut line up the hip, and holding the shingles firmly without exposing nails. They afford complete protection to the hips, being a perfect covering for each course of shingles or slates, and absolutely preventing rain or snow from getting into the hips. They also preserve the symmetry of the building and give the roof a neat and finished appearance.



THE PRENTICE HIP SHINGLE.

The sole manufacturers of this improved shingle is the Metallic Hip Shingle Company, Toledo, Ohio.



RESIDENCE OF JOSEPH P. BEACH ESQ.
PINE ORCHARD, CONN.



First Story Plan.

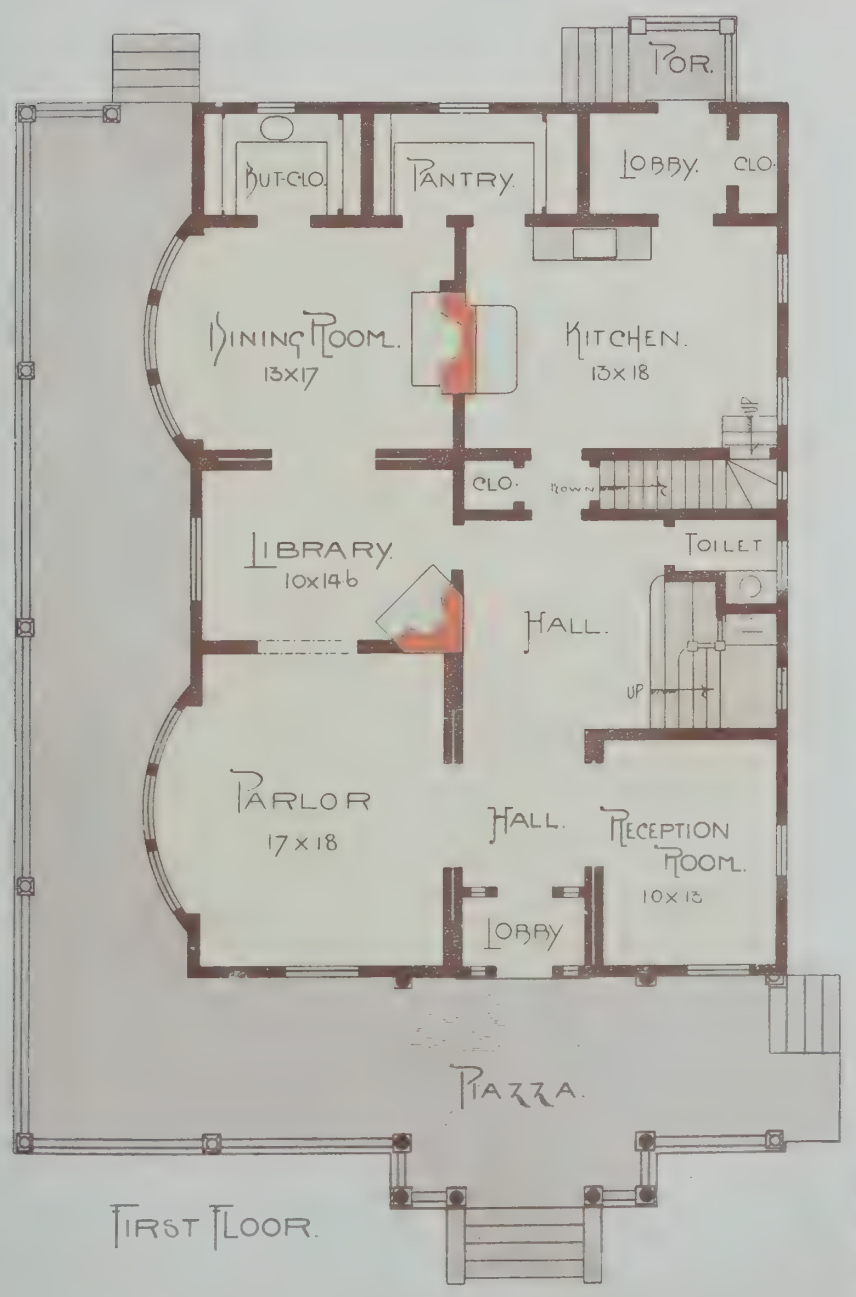


Second Story Plan.

BOSTON PUBLIC



RESIDENCE OF SEWARD W. JONES ESQ.,
NEWTON HIGHLANDS, MASS.



FIRST FLOOR.



SECOND FLOOR.

BOSTON PUBLIC LIBRARY

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RESIDENCE OF JOS. P. BEACH, ESQ., PINE ORCHARD, CONN.—See Page 76.

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NEW YORK, JUNE, 1893.

THE

Scientific American,

ARCHITECTS AND BUILDERS EDITION.

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This is a special Edition of THE SCIENTIFIC AMERICAN, issued monthly. Each number contains about forty large quarto pages, forming, practically, a large and splendid **Magazine of Architecture,** richly adorned with *elegant plates in colors* and with fine engravings; illustrating the most interesting examples of modern Architectural Construction and allied subjects.

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RESIDENCE OF JOSEPH P. BEACH, ESQ., PINE ORCHARD, CONN.

One of our colored plates this month represents the above design. One of the most notable circumstances in relation thereto is its economy. The actual cost of the house, ready for occupancy, was only twelve hundred dollars. The floor plans give the dimensions of the principal rooms. There is an attic with four bedrooms. The piazza space is ample. For a seaside residence, to be occupied in the summer season, the house has proved very desirable. Our colored plate is a faithful reproduction of the building, and was prepared from a photograph taken specially for the SCIENTIFIC AMERICAN. The plans and specifications, by Munn & Co. On page 75 we give some additional photographic views of the house, together with the boat landing and bridge, the construction of which will be readily understood by a glance at the picture.

RESIDENCE AT NEWTON HIGHLANDS, MASS.

We present as the subject of one of our colored plates in this issue a residence recently completed for Seward W. Jones, Esq., at Newton Highlands, Mass. The design is treated in the classic style, and the features are the swell bay windows at side, and the ornamental porch at front. The underpinning is built of rock faced bluestone. The exterior framework is sheathed, clapboarded and painted Colonial yellow with ivory-white trimmings. Blinds painted bottle-green. Roof shingled and left to weather finish. Dimensions: Front, 37 ft.; side, 50 ft., not including piazza and porch. Height of ceilings: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The interior arrangement is most complete, and the various rooms are finished in a handsome manner. The vestibule and front hall are trimmed with antique oak, both have paneled wainscoting, and the former a floor laid in mosaic. The broad staircase, of unique design, is carved in an elegant manner, and it has a paneled divan on first landing. It is lighted by a cluster of windows, glazed with an excellent color scheme. Reception room is treated in old ivory-white and gold. Parlor and library are trimmed with sycamore, and the dining-room with quartered oak, the latter having a paneled wainscoting. The fireplaces are built of Tiffany brick, with hearth laid of same, and provided with carved mantels, mirrors, etc. Kitchen, pantries and lobby are trimmed with whitewood, finished natural. The pantries are of unusually large dimensions. The butler's closet, 6 ft. x 9 ft., is fitted up with drawers, cupboards and bowl, while the store pantry, 6 ft. x 12 ft., is fitted up complete. Lobby, large enough to admit icebox, is furnished with a coat closet. Kitchen is wainscoted and provided with the usual fixtures complete. The second floor contains four bedrooms, large closets, dressing and bath rooms. These apartments are trimmed with whitewood. Bathroom is wainscoted with oak and furnished complete. Third floor contains two bedrooms, trunk room and billiard room. Cemented cellar contains laundry, furnace and other necessary apartments. Cost $9,000 complete. Messrs. Rand & Taylor, architects, Boston, Mass.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE ON BEACON HILL, BOSTON, MASS.

We publish on pages 82 and 83 plates illustrating a residence, Colonial in treatment, which has been recently erected for G. W. Armstrong, Esq., on Beacon Hill, Boston, Mass. The building is constructed in the most substantial manner and the workmanship is unsurpassed. The materials are of the best quality and they have received the most careful and thorough attention from foundation to roof. The underpinning is built of granite. The exterior framework is covered with sheathing, paper and shingles, left to weather finish. Roof shingled. Dimensions: Front, 84 ft.; side, 53 ft. 6 in., exclusive of piazza and porte-cochere. The interior is arranged so as to unite convenience with elegance, and the plans show many large rooms that are handsomely finished. The vestibule walls and ceiling are entirely of oak, and paneled. The main hall is trimmed with oak. It has a paneled wainscoting, ceiling beams and a hardwood floor. The staircase is a grand one, and it has a paneled divan, and neatly carved newel posts, balusters and rail. The toilet is located conveniently. Reception-room is trimmed with oak. Parlor is treated in ivory-white and gold, and it has a fireplace furnished with a tiled hearth and facings, and a Colonial mantel with mirrors, columns, etc. Library is trimmed with cherry, and it is fitted up with bookcases built in, window seats and fireplace. Dining-room, trimmed with oak, has a paneled wainscoting and ceiling beams. The buffet is also built in and it is carved in an elegant manner. Butler's pantry, kitchen, laundry and rear hall are trimmed and wainscoted with ash, and are furnished in the best possible manner. The servants' hall and staircase are private from cellar to third floor. The second floor is trimmed with cherry, and it contains two sitting rooms, four bedrooms, nursery, dressing room, store-room and two bathrooms. Bathrooms are wainscoted and provided with the usual fixtures. Third floor contains billiard room, two bedrooms, trunk-room, besides two servant bedrooms and bathroom. Cemented cellar contains furnace and the necessary apartments. Messrs. Shepley, Rutan & Coolidge, architects, Boston, Mass.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN

A COLONIAL RESIDENCE AT MONTCLAIR, N. J.

The photographic plates on pages 80 and 81 illustrate a residence, Colonial in treatment, recently erected for William C. Whiting, Esq., at Montclair, N. J. The design is excellent. The materials are of the best quality of their respective kinds, and they are put together in a thorough workmanlike manner. The lines of the building are well broken by the spacious piazza, bay windows and dormers. The underpinning is built of rough faced quarry stone, laid with irregular, broken, pitch joints. The piers to piazza posts are built of similar stone. The building above is sheathed with hemlock boards, put on diagonally, covered with paper, and then clapboarded with Michigan strips. The exterior is painted pearl-gray with ivory-white trimmings. Roof shingled and painted red. Dimensions: Front, 38 ft. 8 in.; side, 37 ft. 10 in., exclusive of piazza and rear porch. Height of ceilings: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft.; third, 9 ft. The interior is finished in a most complete manner, and is trimmed throughout with whitewood, finished natural. The door and window openings have heavy moulded casings. The hall is the principal feature. It has a paneled wainscoting and a hardwood cornice. The staircase, built of antique oak, is provided with a massive carved newel, the third newel post running to floor, forming an arch, provided with a spindle transom. Parlor and dining-room have bay windows and open fireplaces, the latter provided with tiled hearths and facings and ornamental mantels of oak with mirrors. Kitchen and pantries are wainscoted and are fitted up in the best possible manner. The second floor contains four bedrooms, large closets and bathroom, and the third floor contains three bedrooms and storeroom. Bathroom is wainscoted with ash, and is provided with the usual fixtures. Cemented cellar contains laundry, furnace and other necessary apartments. The ceiling in cellar is plastered. Cost, $5,500, complete. Messrs. Munn & Co., architects, New York.

Our engravings were made direct from photographs of the buildings, taken specially for the SCIENTIFIC AMERICAN.

A DWELLING AT ELM STATION, PA.

On page 77 we publish a dwelling recently erected for Messrs. Lowry & Goodman, at Elm Station, Pa. The building has many bay windows and towers, and a spacious piazza. The underpinning and first story is built of rock-faced Chestnut Hill granite, laid up at random; second story and gables are covered with shingles, and painted a light-yellow with bottle-green trimmings. Roof shingled. Dimensions: Front, 35 ft. 6 in.; side, 55 ft. 6 in., exclusive of front piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The plan is most convenient. The interior throughout is trimmed with white pine. The hall and staircase hall are separated by a screen, filled in with spindlework. The ornamental staircase is turned out of oak, and it has a carved newel post. The fireplace is built of brick, with hearths and facings of same, and a mantel of antique oak. Parlor is treated in ivory-white, and it has a similar fireplace, with tile trimmings and a mantel to match trim. The remainder of the woodwork is finished natural. Library has a circular bay window, and dining-room has a conservatory at rear, and a butler's pantry fitted up with bowl and dressers complete. The feature of this interior is the various apartments, provided with double sliding doors, thus giving a very attractive vista of the entire suite. Kitchen and laundry are wainscoted and furnished with the usual fixtures. There are four bedrooms, large closets and bathroom on second floor, and two bedrooms and trunk-room on third floor. Bathroom is wainscoted. Cemented cellar contains furnace and other apartments. Estimated cost, $5,200. The proprietors were the architects.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

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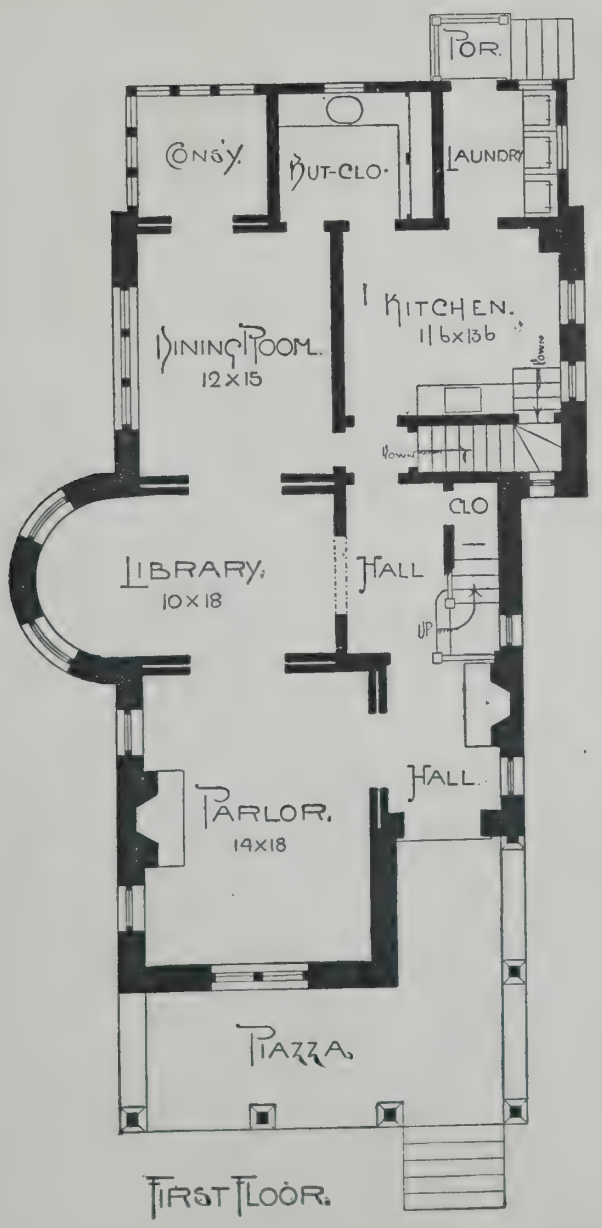
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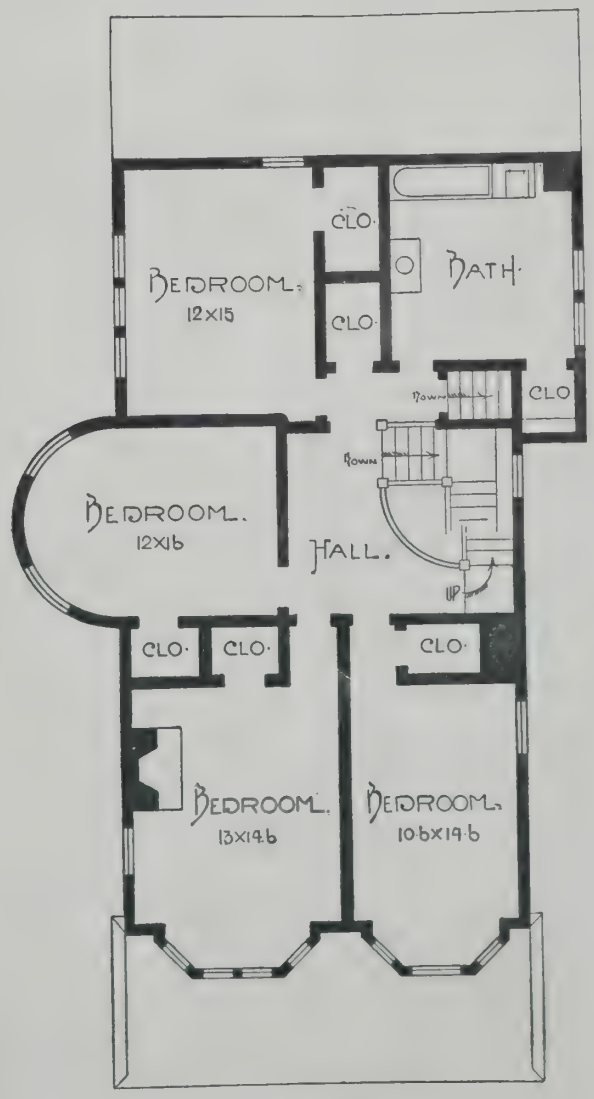
361 Broadway, New York.

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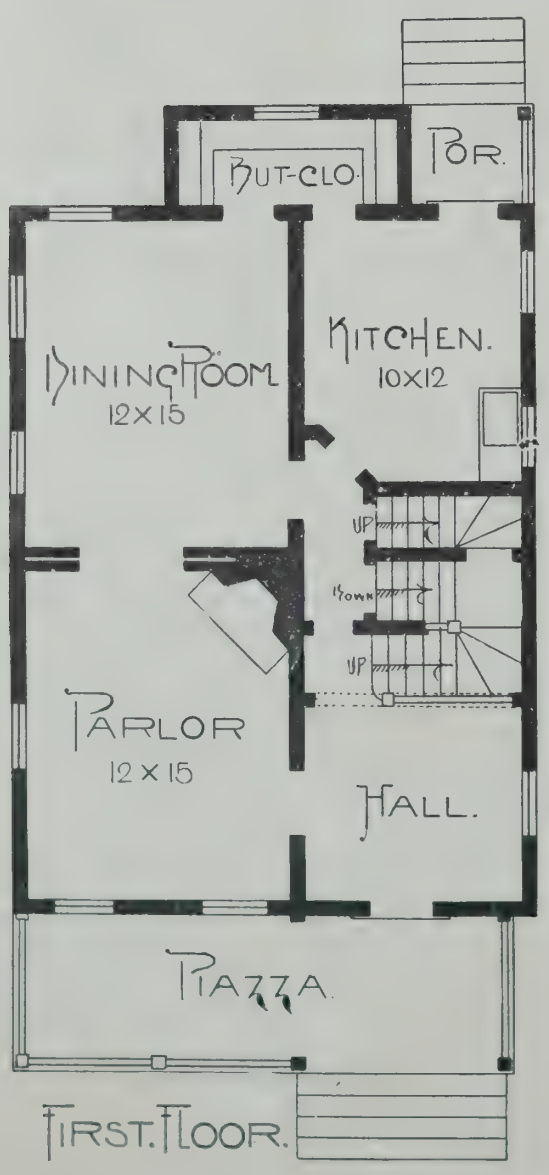
FIRST FLOOR.

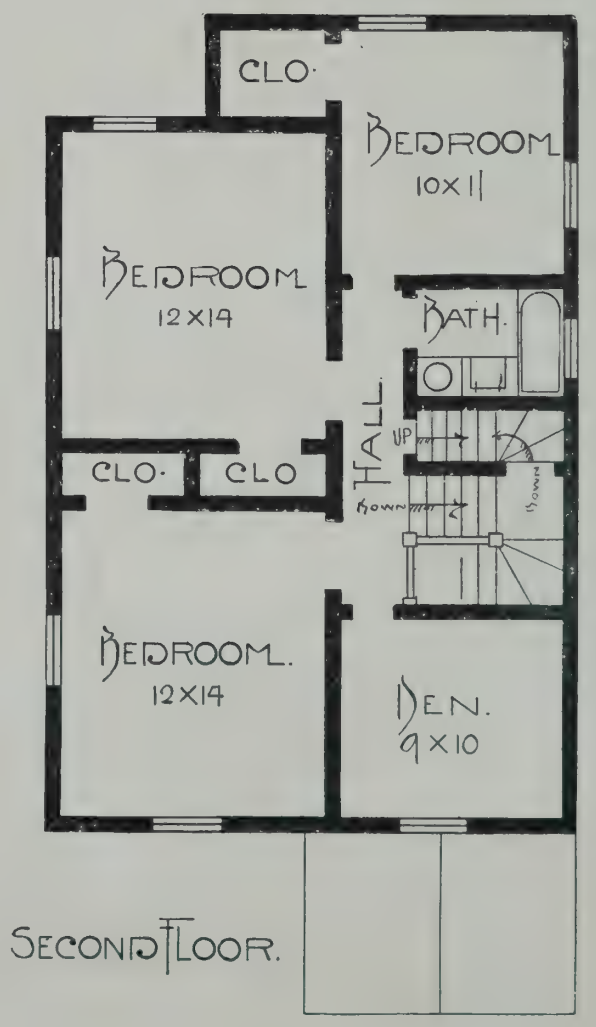


SECOND FLOOR.

A DWELLING AT ELM STATION, PA.—See Page 76.

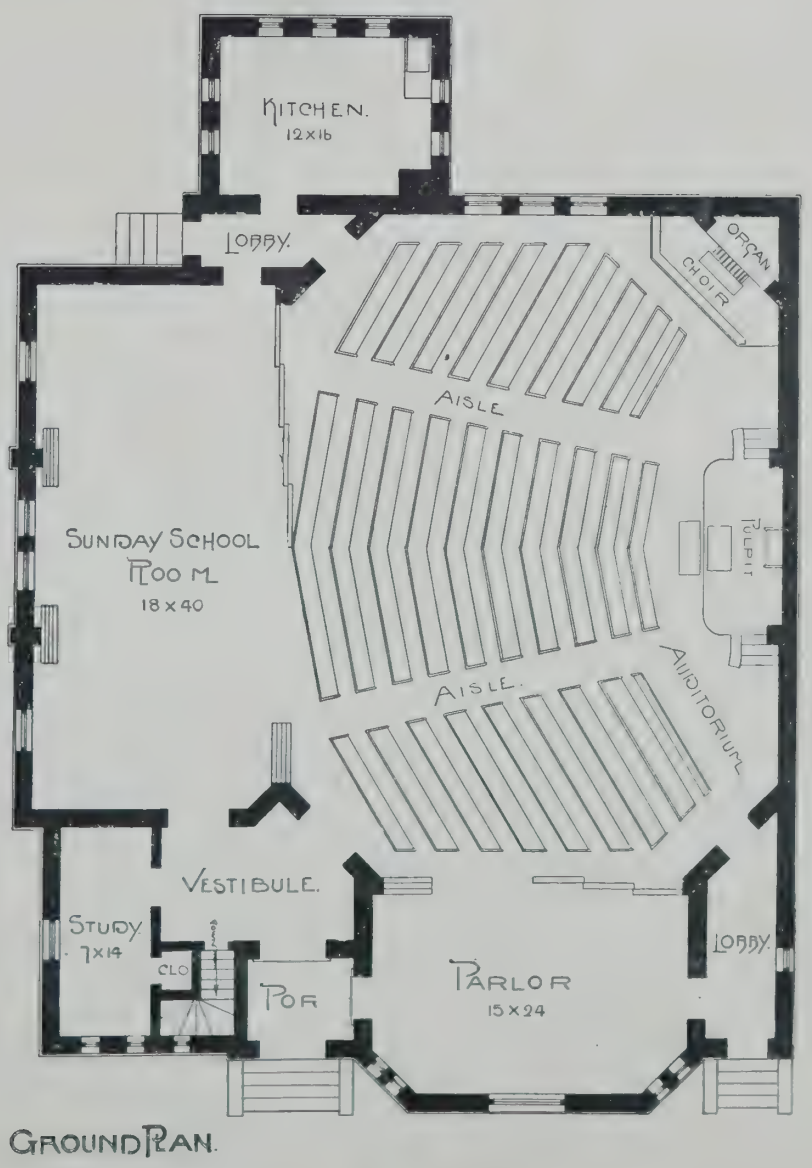






A DWELLING NEAR LONGWOOD, MASS.—See Page 81.



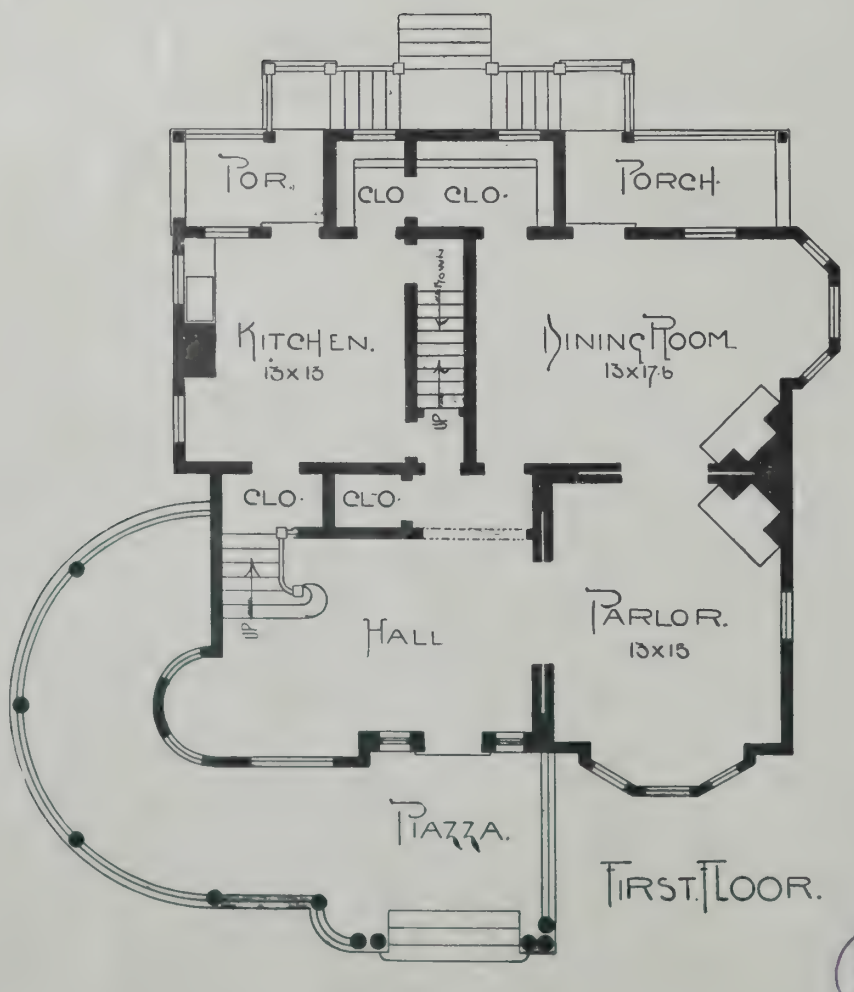


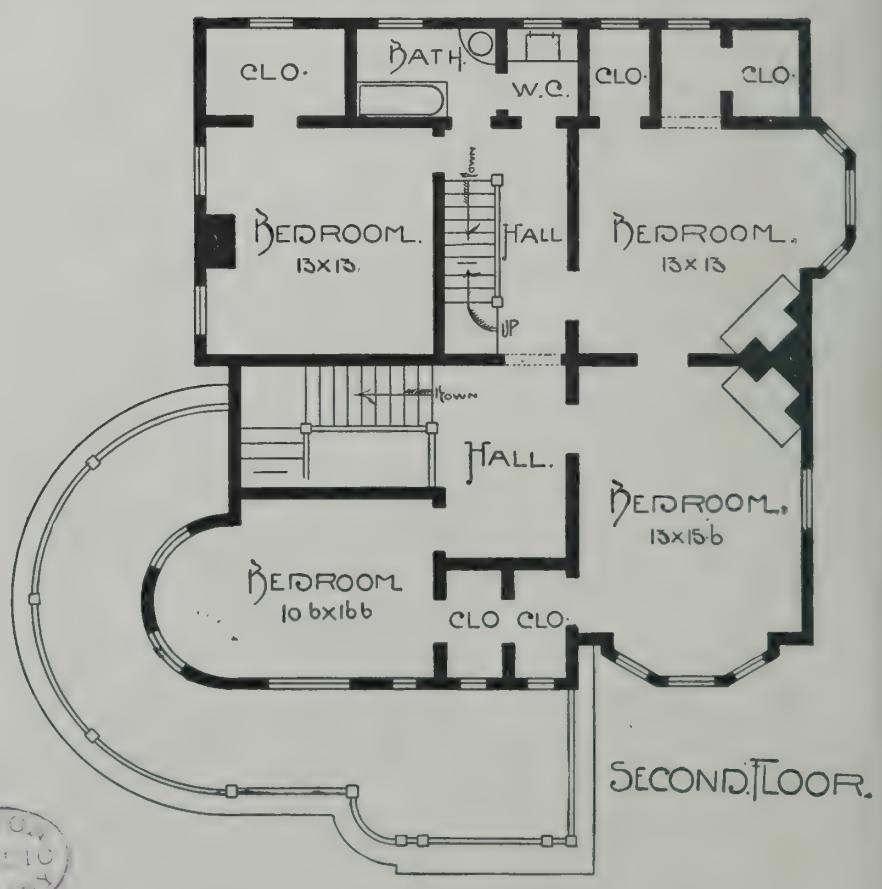
GROUND PLAN.

PUBLIC LIBRARY

FIRST CONGREGATIONAL CHURCH, PLAINFIELD, N. J.—See Page 81.







BOSTON PUBLIC LIBRARY

A COLONIAL RESIDENCE AT MONTCLAIR.—See Page 76.

A DWELLING NEAR LONGWOOD, MASS.

We present on page 78 a dwelling of modern design and low cost, which has been recently erected for D. H. McKay, Esq., near Longwood, Mass. The design is plain and square, but substantial and convenient, and is finished in a thorough manner. The underpinning is built of rock faced granite, laid up at random. The exterior framework is sheathed and then covered with felt paper. The first story is clapboarded and painted Colonial yellow with white trimmings; second story is shingled and stained sienna. Roof shingled and painted red. Dimensions: Front, 23 ft. 6 in.; side, 36 ft. 6 in., exclusive of front piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The interior throughout is trimmed with whitewood. The hall is provided with an ornamental staircase, with turned newels, posts and balusters. This hall has a window glazed with stained glass. Parlor is finished in China white. It has an open fireplace built of brick, with a tiled hearth and facings, and a mantel with Colonial columns and mirror. Dining-room is separated from parlor by double sliding doors. It is well lighted, and access to kitchen is through butler's closet, which is fitted up with drawers and shelves inclosed by glass doors. Kitchen is wainscoted and fitted up replete. The second floor contains three bedrooms, den and bathroom, while the third floor contains trunk room and one bedroom. Bathroom is wainscoted with narrow beaded stuff and is provided with the usual fixtures. Cemented cellar contains a laundry, furnace and other necessary apartments. Cost about $2,200 complete. This building can be built for much less in some localities. Mr. Austin W. Pease, architect, 68 Devonshire Street.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

THE FIRST CONGREGATIONAL CHURCH, PLAINFIELD, NEW JERSEY.

We present on page 79 a design for a suburban church which has been erected for the First Congregational Society, at Plainfield, N. J. It is built of local brick, laid in red mortar, with brownstone trimmings. The roof is covered with blue slates and finished with cresting and finials. The porch has a floor laid in mosaic. The vestibule forms an entrance to study, schoolroom, auditorium and parlor, and also contains the stairway to cellar. The interior is finished in cherry throughout and is wainscoted with narrow beaded stuff. The pews, pulpit and furniture are of ash. The auditorium, 37x50 ft. has a seating capacity of 300. The schoolroom and parlor are separated from auditorium by double sliding doors respectively, or they can be thrown together as the occasion requires. The schoolroom can also be divided into three separate apartments. The kitchen is furnished with the usual fixtures complete. The building is well lighted by windows, glazed with delicate tinted glass. Cemented cellar contains furnace and other necessary apartments. The building cost $11,000, furniture and fixtures $2,300, and organ $1,700, making a total expenditure of $15,000. Oscar S. Teale, architect, 126 Liberty Street, New York City, N. Y.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFC AMERICAN.

A RESIDENCE AT BRIDGEPORT, CONN.

On page 84 will be found an engraving and floor plans of a residence recently erected for Edmond Thompson, Esq., at Beardsley Park, Bridgeport, Conn. The design is excellent, and the plan unique. It has many bay windows, piazza, balcony and a pleasant outlook. The underpinning is built of rock faced bluestone. The first story is clapboarded and painted a dark brown; second and third stories are shingled and stained sienna. Roof is covered with octagonal cut slates. Dimensions: Front, 35 ft.; side, 47 ft., not including front piazza. Height of ceilings: Cellar, 7 ft. 6 in.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The interior throughout is trimmed with whitewood. This woodwork is stained and finished in cherry. Hall, spacious and well lighted by stained glass windows, contains an ornamental staircase turned out of the natural wood. Parlor and library have fireplaces furnished with tiled hearths and facings and hardwood mantels, mirrors, etc. Library has a corner bookcase and a study with an oak floor. Dining-room has a nook for a buffet. Kitchen and pantries are trimmed and wainscoted with whitewood, finished natural. These apartments are furnished with the usual fixtures in the best possible manner. The feature of the second floor is the broad hall, which extends the entire length of building. This floor contains four bedrooms, den and bathroom, the latter wainscoted and furnished replete. Third floor has a similar hall, two bedrooms and trunk room. Cemented cellar contains laundry, furnace and other apartments. Cost $5,500 complete. Mr. A. H. Beers, architect, Bridgeport, Conn.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

WHEN wood is used for street paving it should be treated so it will not absorb moisture. If not so treated, it becomes in time objectionable.

CHICAGO CONSTRUCTION.

THE EXTERIOR OF A TWELVE-STORY BUILDING PUT UP IN THIRTY-NINE DAYS.

Last night the new twelve-story Boyce Building, at 112 and 114 Dearborn street, was brought under roof. Thirty-nine days ago the structure presented an appearance as shown in the accompanying illustration. The making of leases for the building, which has to be ready for occupancy May 1, began last week, and 50 per cent. of the offices are already rented. The tenants will not be delayed one day. Thousands upon thousands of pedestrians on Dearborn street have seen the building grow almost



BOYCE BUILDING, JAN. 30.

visibly and marveled at this latest and fastest illustration of "Chicago construction." The contractor, C. Everett Clark, was delayed for months in his work by the failure of the structural iron to arrive from the Eastern mills. When the material did arrive the work was pushed day and night, and even a faster record was made than in the celebrated case of the Ashland Block. All the partitions are completed up to the seventh floor, and the steam and plumbing plants are in. The brick and terra-cotta work for twelve stories was put in within twenty-two days, ten stories of iron work in twenty-six days, and last night the building was under roof. The exterior has been much changed and greatly improved in design since the



BOYCE BUILDING, MARCH 11.

steep-pitched gable roof was abandoned. Henry Ives Cobb is the architect of the structure, which will cost $300,000.

W. D. Boyce, the owner of the handsome structure, said last night: "Under the prevailing system of constructing office buildings it is not necessary to lose over six months, providing the iron and exterior material is ready. The excavation for a twelve-story building like mine can be made and the shell be completed in seventy-five days. Consequently an owner has not need to lose a year's time in demolishing an old and putting up a new building. The difference in the cost of labor by putting two or even three relays of men to work instead of one is nothing compared with the loss of rent for six months." —*Chicago Herald.*

The Fifth Avenue Theatre,

NEW YORK CITY.

BY HENRY M. STEVENS.

We continue from our May number our illustrations and descriptions of this magnificent and costly building. See pages 86, 87, 88.

THE BROADWAY LOBBY.

Entering the theatre by the way of the regular Broadway entrance, it will be noticeable that the style of the exterior is adhered to throughout entrances, foyers and auditorium in all its elaborateness. The pilasters along the walls of the entrance represent Sienna marble, with capitals in ivory and gold, and the ceiling overhead is vaulted in tile, on which are decorated ribs in plaster relief, the subject of the ornamentation being fruits and flowers, and on the plain surfaces of the walls and ceilings are frescoed ornaments in color and gold. There are three divisions combined in this entrance: the outer lobby next to the street, with iron inclosing gates, then the box-office lobby, and an inner lobby next to the theatre, the purpose of which divisions being to control the rush of cold air into the theatre when the outer doors are opened, both the box-office section and the inner lobby having large steam radiators.

The view of the Broadway entrance, submitted in connection with this description, permits the reader to obtain an excellent idea of its harmonious architectural lines and elaborate plaster relief work, together with the charmingly designed light fixtures on the side walls, and the effective cabinetwork of doorway and box-office.

THE TWENTY-EIGHTH STREET FOYER.

In the theatre proper, at the left, is the magnificent foyer, of which a view is also given. The ceiling is of half circle form, with ornamental plaster relief ribs divided into panels, a heavy rich cornice supported on pilasters and full columns of Mycenian marble.

THE MYCENIAN MARBLE IN THE FOYER.

The main decorative feature of the Twenty-eighth street foyer is the beautiful coloring which the marble columns and marble wainscoting give that superb hall, and when this is contrasted with the ceiling and side walls, in white and pale pinkish terra-cotta, the presentment is one as impressive in composition as it is also original in the most literal sense. The Mycenian Marble Company has succeeded in so cleverly imitating light Sienna marble in the details of all the marble work, that the question of doubting the real character of the material used in producing so charming an illusion has no possibility of being raised in even the minutest inspection of the product employed.

The use of colored marbles for decorative effects more clearly expressed the æsthetic taste and culture of each age of the world's history than any other material, and accentuated, as no other could, its wealth and refinement.

As its day of marble marked the highest culture of Greece, so does the increasing use of the same stone now keep pace with and illustrate the culture and refinement of to-day.

This demand for splendid marble is not a "fad" of the day: it is an evidence and attribute of finer breeding and a higher education.

Every part of the globe is searched to obtain the stone to satisfy that craving for the decorative and the beautiful which exists not alone among the rich, but among the masses: Italy, Austria, Hungary, Turkey-in-Asia, Egypt and Algeria furnish the major part of the colored marbles coming to this country, although every country of the world contributes to the quantity and variety used.

The Numidian marbles, however, seem to be in highest favor. For centuries these marbles, quarried under the burning sun of African skies, were used to adorn the cool interiors of Greece and Carthage and Rome. They were used in colonnade and temple, in bath and banquet-hall, to beautify the shrines of now forgotten gods, to please the eye of maid or matron, or to brighten the revelry of men wearied of wars, defeats and conquests: mottled, or traversed with veins of every form, and with colors blended as only nature can blend them, into the warmest and softest tints, producing effects unequaled in any other material, it is not strange that long before the Christian era the æsthetic culture of the Pagan found its highest expression in them, the grandest ruins testifying that architect and builder alike, not only felt, but yielded to their superior charm.

Many of the quarries whence these marbles came were long since exhausted, and others have doubtless been covered up and lost, for there are many examples found in ancient ruins whose source is now unknown. The remoteness of many of the quarries still known, and the high cost of transportation, prevent their general use, but many splendid specimens of them are to be found in the best buildings recently constructed.

Imitations of these marbles have been attempted from time to time with varying success, the best known being that called "Scagliola" or, as it is abbreviated, "Scag." It is made of plaster of Paris and color, and was very suc-

(*Continued on page 85.*)

A RESIDENCE ON BEACON HILL, BOSTON, MASS.—See Page 76.

BOSTON PUBLIC





A RESIDENCE ON BEACON HILL, BOSTON, MASS.—See Page 76.





A RESIDENCE AT BRIDGEPORT, CONN.—See Page 81.

THE FIFTH AVENUE THEATRE.

(Continued from Page 81.)

cessful in a few kinds of marble, but its range was limited in both extent and variety. None of the other attempts are worthy of mention.

Modern skill and science have discovered and developed a method or process by which any marble can be imitated so closely in veining and coloring as to deceive the most expert, the ordinary observer never detecting or suspecting the difference.

For all decorative purposes and uses these manufactured marbles are equal, and for some reasons superior, to the natural stone: they become harder the longer they are exposed to the action of the atmosphere, and receive a high and lasting polish. The Mycenian Marble Company is the only manufacturer of these marbles in the United States, the process is patented, and its success has been phenomenal.

THE MIRROR PERSPECTIVE IN THE TWENTY-EIGHTH STREET FOYER.

The end toward Broadway is filled up between the columns and the tympanum above the cornice with mirrors, magnifying the length of the foyer, and forming a beautiful illusion reflecting the grand staircase and pierced screen above. From a decorative standpoint nothing so heightens and repeats with such charming effect the various details of an architectural scheme, so far as an interior is concerned, as the employment of mirrors. The palaces of Continental Europe are illustrations of the success of this idea, their lofty rooms and corridors having an additional interest to the student and the connoisseur, owing to the adoption of this particular resource for the introduction of lengthened perspective, and of that air of life and gayety so essential to brilliant pictures of that kind; for the purposes for which impressive apartments were originally designed demand the support of a background that shall be indisputably pictorial, or they fail in their object—an object artful to the last degree, and though artificial, yet perfectly admissible, casting over the whole interior arrangement a glamour that deceives the senses, and subjects the spectator to the spell of its influence long after he has left the scene, and the place of which it forms so alluring an attraction.

The entrance to a theatre is no insignificant subject for decorative treatment, and in making so much of the Twenty-eighth street foyer of the Fifth Avenue Theatre as they have, the architect and his artists have kept well in mind an old and subtle truth that "First impressions are everything." The height and length of the interior into which we are suddenly ushered there, are about the first things that we seek to determine. The illusion sought to be produced is complete. The hall, which in itself has not great length, though admirably proportioned, appears twice as long and twice as high as it otherwise would, had not the superb mirror placed there against the east wall been adopted as a happy expedient in the dilemma in which the architect was placed at this stage of his progress. The impression now, by the aid of the mirror, is one of symmetry, vastness and grandeur.

THE VERMONT MARBLE WORK.

At the opposite end of this lovely hall is the grand Italian marble staircase, which is the principal staircase to the balcony and the boxes on the left side of the proscenium opening. Halfway up is a broad landing, and from this, through a pierced and highly ornamental screen, may be had a view of the foyer.

Both the main entrance and the grand foyer are paved with a perfectly white Vermont marble, with Tennessee marble borders and plinth under columns and pilasters.

There is another marble staircase from the parquet to the balcony on the north side of the theatre, and one immediately under to the smoking room and gentlemen's toilet under the auditorium.

The various staircases of the interior of the theatre, together with the floors of the Twenty-eighth street foyer, and the Broadway lobby and the first story of the stage portion of the exterior of the Twenty-eighth street side, are, as has been indicated, all of white Vermont marble, and form the contract of Mr. Thomas J. Hagan, of the New York Steam Marble Works, who is well known as a pupil of the talented builder, the late William Joyce. Mr. Hagan served his apprenticeship to his trade under that old master of building construction when the latter was employed upon the Fifth Avenue Cathedral. When Superintendent of the Vermont Marble Works, with which he was identified for a long time, Mr. Hagan replaced the wooden spire on Grace Church, at Broadway and Tenth street, by the present superb one of white marble, gaining great prestige by his admirable execution of his contract, and receiving the compliment from James Renwick, the architect, of having made the finest spire in the world, in point of symmetry of form and technical excellence. The great staircases to the Capitol at Washington, the extension to the Parker House, Boston, and the Church of Our Lady of Good Counsel in East Ninetieth street, are among a number of the prominent contracts which have added to his reputation in the building trade. Since the recent termination of his connection with the Vermont Marble Works he has formed a partnership with Ex-Congressman John Quinn, under the title of the New York Steam Marble Works. Mr. Quinn having been himself an extensive builder on the west side, as well as a practical marble cutter, the partnership will gain by his association with it from a trade standpoint. Mr. Quinn's success, while in Congress, in defeating the measure which was introduced for the removal of General Grant's remains from New York to Washington, has given him a most favorable celebrity.

THE BRASS WORK.

The popularity of metal work for decorative purposes has undoubtedly its foundation in the fact that it has a practical as well as an ornamental side to its character. Its durability is naturally its main feature, and its susceptibility to the highest perfection of polish gives it its artistic value.

Of all the metals, aside from those usually classified as precious, brass, owing to its warmth of color, and its adaptability to almost every conceivable form of industrial art, as well its application to the expression of the loftiest conception of sculpture, must be placed in the front rank. It is the congener of bronze.

The interior of the theatre, therefore, has no mean adjunct to its presentment of decorative beauty in the brass work of Mr. H. Wm. Steinert, introduced in such fortunate collaboration with the efforts of his talented coadjutors. The Twenty-eighth street foyer, the Broadway lobby, the staircases to the first and second balconies, and the smoking-room, the orchestra rail, etc., prove this in the examples he has furnished there, and which are but further attestations of the excellence of his workmanship, exhibited elsewhere more elaborately, but not less skillfully, in such buildings as the new opera house at Middletown, Conn.; the Montauk Club in Brooklyn; the Manhattan Athletic Club; the new building of Messrs. J. B. & J. M. Cornell at Eleventh avenue and 26th street; the Corbin Building at John street and Broadway; Holmes' Star Theatre, Brooklyn; the Bank of New Amsterdam throughout; the Murray Hill Baths, at 42d street, near Sixth avenue; Messrs. Park & Tilford's building, at Fifth avenue and 59th street; the Imperial Hotel, at 32d street and Broadway; and in the work of the buffet floor at the Casino, and of the Manhattan Elevated Railway.

THE GAS AND ELECTRIC FIXTURES.

The Archer & Pancoast Manufacturing Company has made an exceedingly artistic success of its contract in the theatre.

If the story of civilization is, as is now very generally admitted, largely told in the history of interracial influence, then surely one of the broadest, deepest currents of international development in industrial art is to be found in the fruitful result of that branch of decorative metal work towards which all the efforts of this company have been directed for the past quarter of a century. France has been the vital force in this transference of thought in industrial art.

France, the second manufacturing country of the globe, and the only one which rivals Great Britain, has united art and industry in a manner unparalleled elsewhere.

Institutions like the "Ecole Centrale des Arts et de Manufactures" and the "Conservatoire des Arts et Métiers" are mainly responsible for encouraging this condition of things, but the rare, native sense of beauty peculiar to the French as a nation is the true source of inspiration, to which we must attribute this intelligence in combining the beautiful and the practical.

American industrial art, as illustrated in the products of this company, has been improved by this contact with French ideas.

It has, however, a fresher, broader vision of things on that very account, and has chosen an independent course of its own, that indicates very distinctly that it is free from any suspicion of mere servile imitation.

It establishes now for itself a position which these examples of this veteran house, as they appear against the beautiful background of foyer and auditorium, affirm with unusual impressiveness.

It is an intense and splendid ray that is flashed upon us in these embodiments of that age whose history records the recovery of classical art. Renaissance influence, tempered by French transmission, finds here the most sympathetic response. These graceful sidelights along the walls of the ground floor, and of the galleries—the design being a bunch of pond-lilies reflected in a garlanded sconce mirror in a gold frame, just as the natural flowers are reflected upon the water in which they grow; the main chandelier depending from the superb dome of the theatre, also floral in design, and presenting an immense number of electric lights; and the fixtures decorating the lovely foyer of the Twenty-eighth street entrance, with its gleaming marbles and glittering mirror, its white marble staircase, and semicircular perforated screen overhead, through which we catch glimpses of the broad landings as the stairs turn in their course to the first gallery—all these attest how exquisite is the setting, the framework, which the Archer & Pancoast Company can give to any picture for interior decoration that may be confided to its disposition. The history of the house itself may be said to be the history of its own particular branch of trade in this country, as it has been in all innovations which have gradually revolutionized so important a department of decorative art. It has certainly kept pace with European models in so far as delicacy and beauty of design are concerned. The refined homes of the metropolis, and all superior buildings lately erected here, verify these facts with indisputable directness.

THE AUDITORIUM.

Interior Decoration.

On entering the theatre one will be impressed with the cozy and comfortable appearance of the auditorium, an unusual feature in a theatre seating 600 people on the parquet floor. The effect at first sight is one of shallowness, but this is mainly due to the great breadth, which is over 70 feet. On the north side are the exits to the open court and to Broadway.

By reason of the great seating capacity—viz., 1,400—the balcony and gallery are forced nearer the stage than is usual, but to the actor it is the ideal form, as it brings him close to his hearers, and makes the choice of seats of no consideration to the buyer.

Growing out of the proscenium boxes of the new theatre is the great splay of the proscenium itself, paneled and enriched with Italian ornamentation, and from this springs the dome, beginning from a heavy cornice as a base, and supporting heavy ribs arranged in pairs. We reserve for our next issue further descriptions and illustrations of the interior, and will now only add the names of the principal artisan artists, all of New York, whose labors, under the direction of Architect Kimball, have resulted in the completion of this noble structure:

T. J. Hagan, staircase and flooring of Vermont marble.
Mycenian Marble Co., pillars to hall and console to staircase.
Archer & Pancoast Mfg. Co., gas and electric fixtures.
J. & J. Morrison, caryatides and relief work in plaster
Arnold & Locke, decorations.
H. Wm. Steinert, brass work.
H. Mandeville & Son, carpenter's work.
King & Co., King's Windsor asbestos cement of proscenium arch.
Andrews-Demarest Seating Co., orchestra chairs.
Lord & Taylor, carpets and draperies.
Act drop curtains, Logan Reid.

(To be continued.)

New Lien Law in California.

The new section added to the lien law of the State of California by the last legislature, makes it obligatory on the owner of any proposed building or structure, when it is to be erected by contract, to secure from his contractor "a good and sufficient bond" in an amount equal to at least twenty-five per cent. of the contract price, which bond shall, by its terms, be made to inure to the benefit of any and all persons who perform labor for, or furnish materials to the contractor, failure on the part of the owner to exact such bond, renders the latter liable for the debts incurred by the contractor.

The design of this amendment is to afford more ample protection to the creditor class, and this object is achieved by making the owner financially responsible for the solvency of the contractor and the contractor's bondsmen. Not a very just or logical method of procedure perhaps, but reasonably sure of being effective.

On the whole, the new law will we think be of benefit to the parties honestly interested in the welfare of the building business. It will have a tendency to cause owners to choose a responsible man in preference to an impecunious "cheap John" when giving out their work. It will require much precaution on the part of both owners and architects in the acceptance of bondsmen, and without doubt responsible parties will be equally cautious about becoming security for irresponsible or tricky contractors.

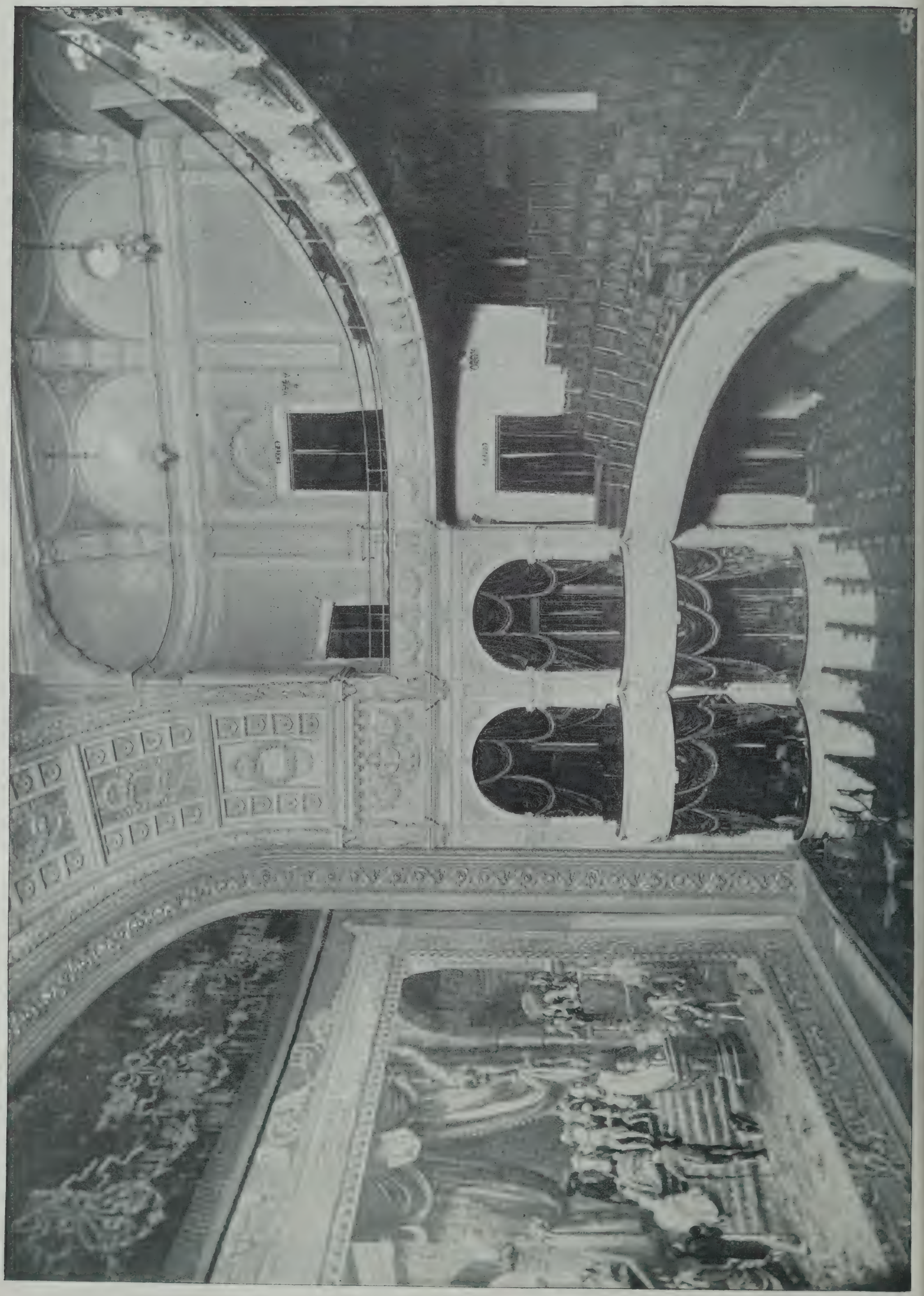
Neglect of proper prudence on the part of either owner or bondsmen, will be so dearly paid, that the man who now secures a large amount of work at figures that will not cover the actual cost of construction will find it more difficult to continue their methods, and will be ultimately driven from the business, or forced to mend their ways. The new departure will afford many a case for the lawyers.

Just what will constitute "a good and sufficient" bond will of course have to be decided by the courts, and the prospects are that a good many decisions will be rendered and appeals argued before positive precedents will be at the disposal of the would-be house builder.

Whether an owner would be safe after having secured a rich and prosperous bondsmen who should become insolvent before the completion of the contract; or in accepting a man of "straw" who should duly qualify before a notary (but whose real estate might be of no more value than an unimproved lot in a suburban cemetery) are problems that will perplex the brains of the architect, and possibly deplete the purses of the owner, till the law is again amended and further experiments made as to the best way to make men honest.—*California Architect.*

PITCH pine beams will shrink in thickness from 18⅜ inches to 18¼; spruce, from 8½ to 8¼; white pine, from 12 inches to 11⅞; yellow pine, a trifle less. Cedar beams will shrink from a width of 14 inches to 13¼; elm, from 11¾ to 10¾, and oak from 12 to 11⅜ inches.

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THE BROADWAY LOBBY OF THE FIFTH AVENUE THEATRE, NEW YORK.

FRANCIS H. KIMBALL, ARCHITECT.

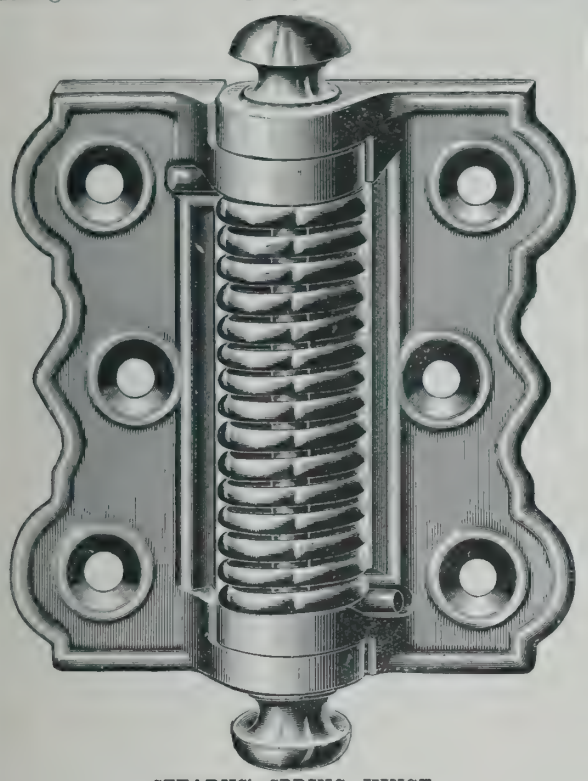


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THE TWENTY-EIGHTH STREET FOYER, FIFTH AVENUE THEATRE, NEW YORK.
FRANCIS H. KIMBALL, ARCHITECT.

AN IMPROVED SPRING DOOR HINGE.

This illustration represents a hinge which always closes the door. It is packed, with tension of the spring adjusted, ready for use. The action of the hinge is exceptionally strong and free. The spring is stiff and elastic, and is



STEARNS' SPRING HINGE.

prevented from getting out of line by the ribs on the pin in the centre of the coil. It is simple in construction, and has no light parts to break or get out of order. The castings are extra heavy. It may be used on either right or left hand doors. The manufacturers are E. C. Stearns & Co., of Syracuse, N. Y.

To Estimate Brick Work.

The Boston *Journal of Commerce* gives the following: Ordinary bricks are about eight inches in length, and, with a mortar joint, about half that in width, so that each brick on the flat will give a horizontal surface of about 32 square inches, or 4½ bricks will cover one square foot. As ordinarily laid, there are nine courses to every 24 inches, or 4½ to the foot; 4½ courses, with 4½ bricks to the course, will give 20¼ bricks to the cubic foot. Waste, cutting and close joints will easily require an allowance of 21 bricks per cubic foot, which will be found a very convenient figure for estimating the number of brick required for a wall of given height and thickness, as it thus becomes unnecessary to find the cubic contents of the wall, but merely to multiply its face area, or the product of its length and height in feet by seven-fourths of its thickness in inches, which, as the thickness is always some multiple of four inches, is a very simple process.

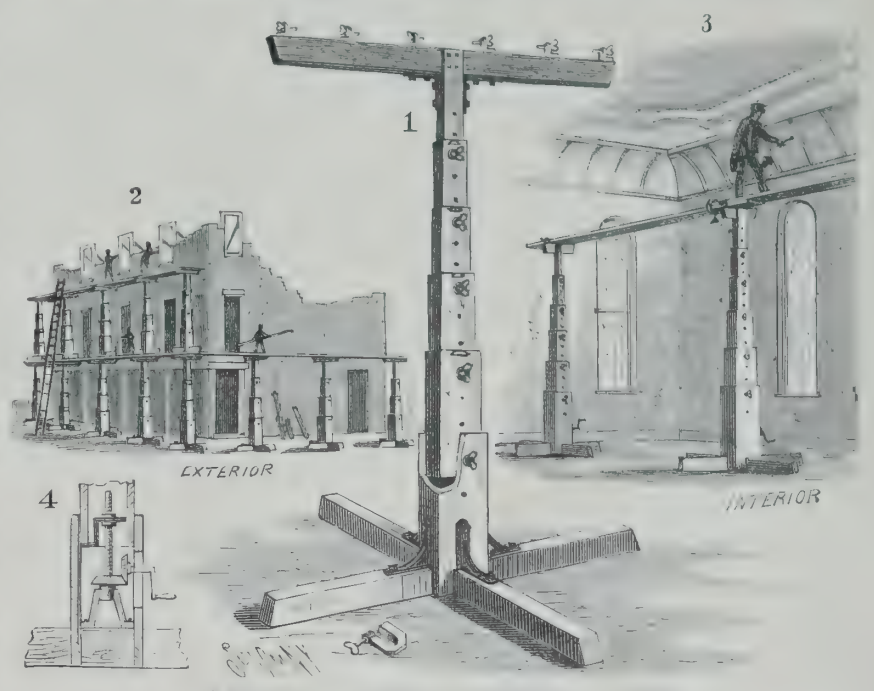
THE SYKES IRON AND STEEL ROOFING COMPANY, of Niles, Ohio, and No. 611 South Morgan Street, Chicago, has a pagoda in the north end of the great Manufactures and Liberal Arts Building, at the Columbian Exposition, and the company invite all interested in their specialty to make this their headquarters. The pagoda is provided with easy chairs, and affords a good place in which to write a letter or see a friend, etc. Mr. R. G. Sykes, a pioneer in this branch of manufacture, expects to be on the ground in person.

Foul Water Main.

Mr. James Duane has described in a paper read before the American Society of Civil Engineers the effect of tuberculation on the delivery of a 48-inch water main. The author remarks that authentic data relating to the effect of tuberculation on the discharging capacity of water mains are rare, and when obtainable are correspondingly valuable. He has had an unusually favorable opportunity for observing the loss of head due to this cause in a large water main, and comparing it with that in a perfectly clean coated new main discharging under the same conditions; both being parallel mains of the Croton water supply system of New York. One line of mains was laid as clean castings, just as they came from the sand. The result was that in seven years the inside was discovered to be tuberculated to a surprising extent. All the lumps were of the same general shape, which was that of a rough frustum of a cone, with a height of one-half or one-third the width of the base, and a roughly flattened top. The largest were at the bottom of the pipe and the smallest at the top. The greatest projection of the lumps was about one inch; and they were so thick as to completely cover the interior surface of the pipe. As compared with the clean tar-coated pipe, the discharging capacity of these corroded mains showed a reduction of about 30 per cent. It was also observed by Mr. Duane that, having reached a certain stage in corrosion, a water pipe does not get worse with age. He regards a properly applied coating of tar composition as giving absolute protection against tuberculation, and cites in support of this belief the fact of a 48 inch main so treated showing as high a coefficient of duty after eleven years' service as when first brought into use.

AN IMPROVED SCAFFOLD TRUSS.

The construction and use of an adjustable telescopic scaffold truss, to facilitate the repair of ceilings and all kinds of outside work upon buildings, are represented in the accompanying illustration. The improvement has been patented by Mr. Thomas Kennedy, No. 279 West 118th Street, New York City. Fig. 1 shows the truss in perspective, Figs. 2 and 3 illustrating its use, and Fig. 4 being a section of its lower portion, showing how a close adjustment of the truss may be made for a particular elevation. The telescoping sections are similarly constructed, of consecutively diminishing size transversely, and the whole is mainly of wood, so that it may be



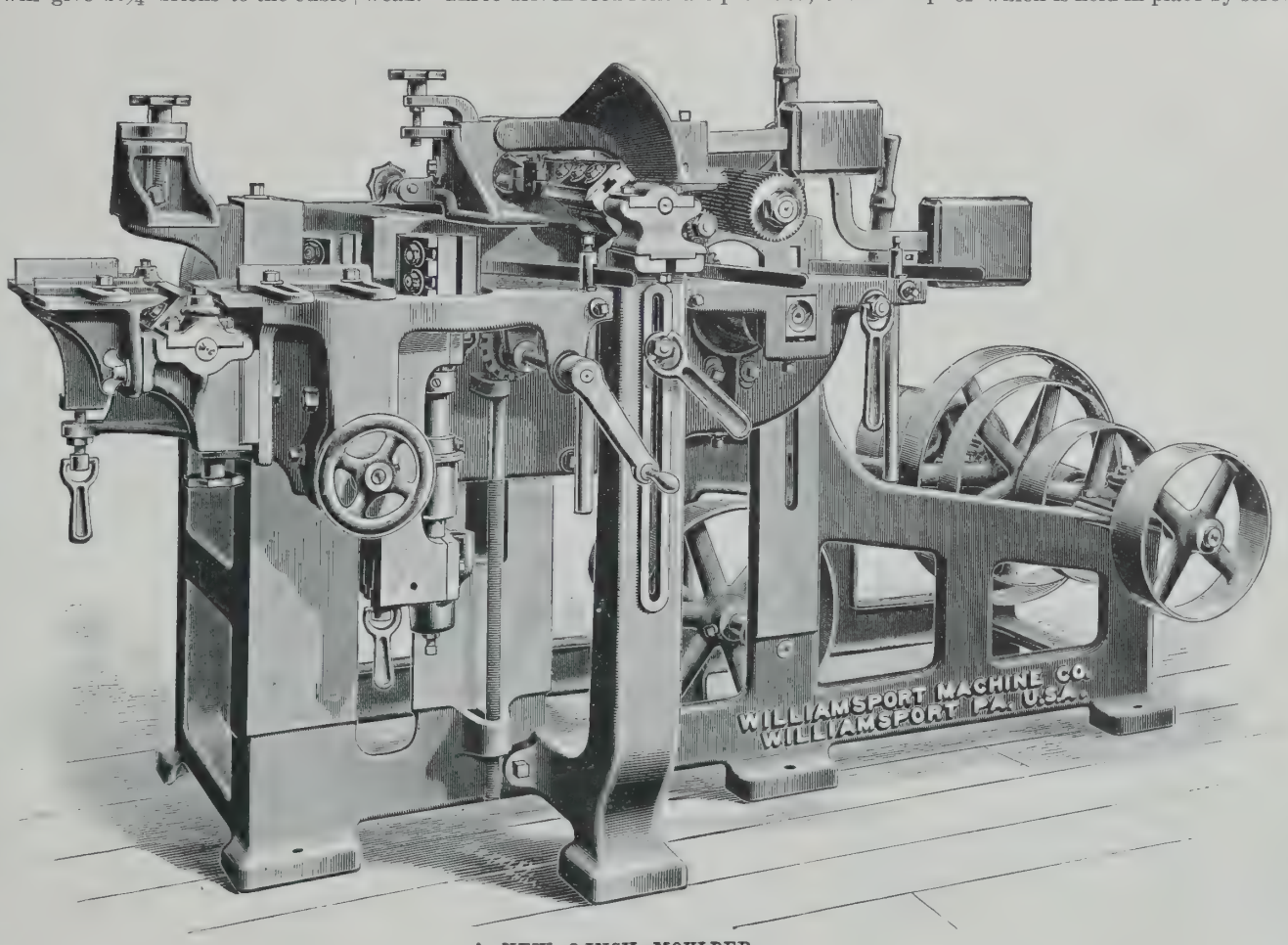
KENNEDY'S SCAFFOLD-SUPPORTING TRUSS.

readily built by any carpenter. The several sections are vertically adjustable by means of bolt holes in opposite sides, through which are passed detachable screw bolts, fitted with locking nuts. For a nice adjustment, after the truss has been extended to the approximate height desired, the bottom section is fitted with a crank and gear, actuating a screw, as shown in Fig. 4, by means of which the other sections may be collectively raised or lowered. The top section is provided with short or long heads for the support of the scaffold floor, the planking of which is held in place by screw irons on the head, and a screw clamp is provided for readily binding in place top planks or stretchers. The adjustment of all the parts is effected without the use of a nail, so that the scaffolding may be readily put up and taken down with little or no noise, and the entire structure, when not in use, can be closed up, so as to occupy but little space.

THE Rialto, at Venice, is said to have been built from the designs of Michel Angelo. It is a single marble arch, 98½ feet long, and was completed in 1591.

AN IMPROVED WOOD WORKING MACHINE.

The frame of the moulder shown in the engraving is in one solid casting, and the extension of the outside bearing of the top head down to the floor adds additional strength to this particular point, which is usually so weak. Three driven feed rolls are provided, the two top ones being very heavily weighted. These can be raised from the work by the lever shown at the top of the machine. The table is substantially locked to the frame in two places, and will drop to about sixteen inches. The outside head can be set to any angle, and adjusted laterally or vertically without changing the angle. This machine weighs 1,800 pounds. It is manufactured by the Williamsport Machine Company, Williamsport, Pa., U. S. A.



A NEW 6-INCH MOULDER.

To remove the white efflorescence which sometimes appears on the face of brickwork, wash the surface with a sponge dipped in a weak solution of muriatic acid.

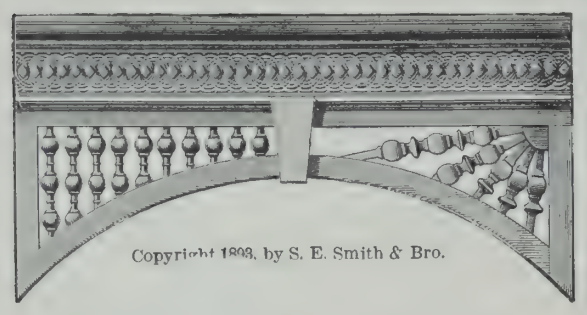
The Canton Steel Roofing Co., Canton, O, suffered a complete loss of their entire plant and office by fire on December 7th last, but the company is now located and running day and night in a new factory, much larger than the old one. It is equipped with the latest and best machinery known for turning out sheet metal goods for buildings, and the company is now able to fill all orders promptly. They report that their sales are larger so far this season than ever before. They have an exhibit at the World's Columbian Exhibition.

Sawdust Building Bricks.

The sawdust is dried and screened, to remove the coarser particles, and is then mixed with cement, lime and sand in the following proportions: One part cement, two parts lime, five parts sharp sand and two parts sawdust. The sawdust is first mixed dry with the cement and sand. The final mixture is pressed into blocks, which are said to be cheap and useful. There is as much lime and more than twice as much sand as sawdust in them.

SOME BEAUTIFUL ARCH WORK.

The illustration represents one of several new designs of arches to go between columns recently produced by Messrs. S. E. Smith & Bro., professional stair builders and manufacturers, of first class modern stair finish, St. Paul, Minn. This firm is constantly getting out new designs to meet the wants of those looking for something a



ORNAMENTAL ARCH OF NOVEL STYLE.

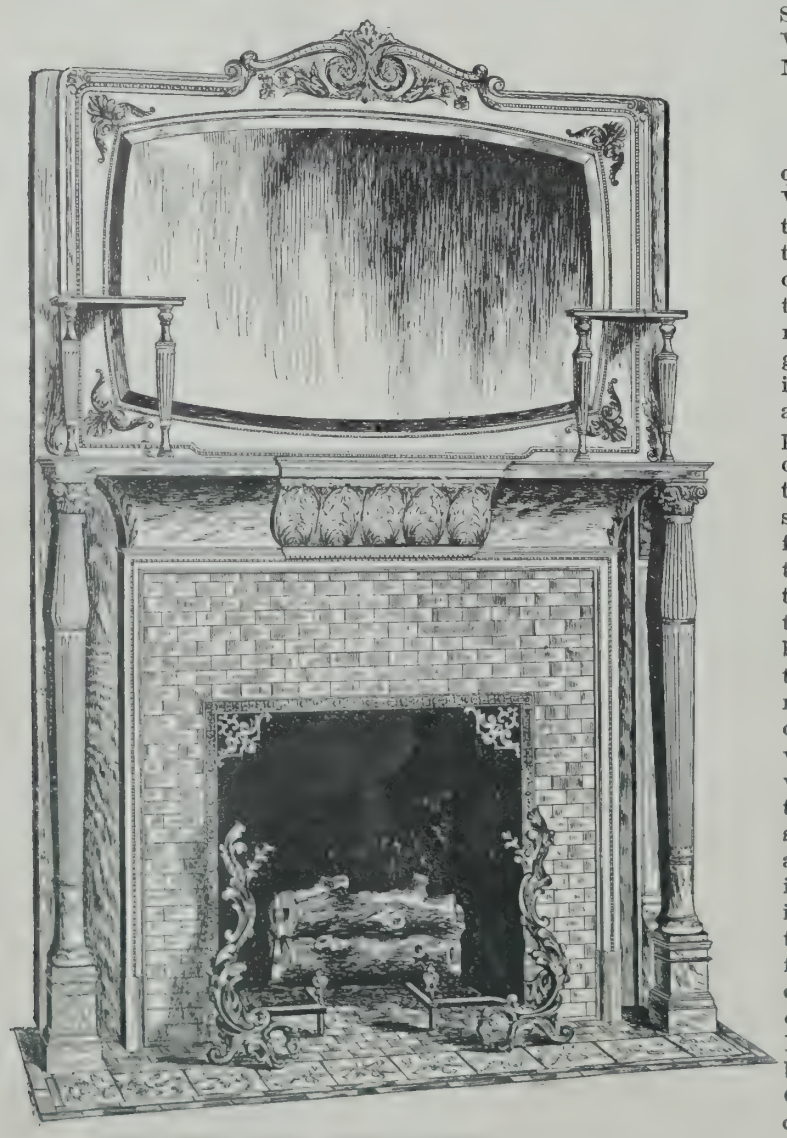
little out of the common, which will be neat and effective in appearance and yet not expensive. The designs are all practical and easily put up by any good mechanic, everything being fitted as far as possible and finished smooth, ready to set up. The firm has had long experience in the business, and its factory is fitted up with special machines and tools for this class of work.

Mineral Wool in Buildings.

To keep houses cool in summer, as well as to keep them warm in winter, with greatly reduced coal bills, mineral wool is now largely used, its present low cost recommending its employment between the rafters, in the walls, and wherever it is desired to keep out cold and dampness, or to keep the heat in during winter and keep it out in the summer. By means of its use in the roof the upper rooms may be made as cool in summer as the lower floors, the high non-conducting properties of the substance preventing the heat from getting into the house. This material is also a most effectual deadener of sound, and rats, mice, and insects avoid it. From its composition it is also destructive to disease germs coming in contact with it. Samples, and any further information desired touching its use, may be obtained of the United States Mineral Wool Company, No. 2 Cortlandt Street, New York City.

WOOD MANTELS.

The handsome design for a wood mantel shown in the accompanying illustration is the production of the Interior Woodworking Company, of 309 Wabash Avenue, Chicago. The company is constantly getting out new styles of



NEW DESIGN FOR A WOOD MANTEL.

artistic fireplace furnishings, and tile work for halls, vestibules and bathrooms, etc. Intending purchasers of work of this kind will do well to write the company for a catalogue.

Sound Titles for Real Estate.

The steady growth, from the first, of the business of the German-American Real Estate Title Guarantee Company, of New York City, would seem quite remarkable, were it not for the fact that the great usefulness of such a company is at once apparent without argument. Their increased business has, however, necessitated the removal of the company to larger offices, which have been obtained on the ground floor of the Mutual Life Insurance Company building, Nos. 36 and 38 Nassau Street, where the company have greatly enlarged space in one of the richest and most beautiful business structures of the city.

Builders, and all engaged in the building trades, are, perhaps, more directly interested than any other class of people in the means for readily ascertaining the validity of titles to real estate. They do not have the time or the means, in the varied classes of work they have to perform, to make investigations as to titles which may be clouded or ownership which may be covered up, and yet it is of the utmost importance that they should have correct information. The subject has always been one full of difficulty, because some apparently slight legal technicality, not obvious to the lay mind, might destroy the value of a good deal of honest research, and involve the builder who depended upon himself in the matter, or upon an incapable lawyer, in irreparable loss.

On this account, it is not to be wondered at that the matter of guaranteeing titles to real estate has, within a short time, grown to be a very considerable business, and one that has been especially favored by builders, for when one can show a guarantee that his title to a piece of property is good, such guarantee being from a company of known high standi g and ample responsibility, then the builder knows that he is working on a solid foundation, and will not have to look out for quicksands. The German-American Real Estate Title Guarantee Company, working to this end, has obtained a well earned success, and become very popular.

We may observe that it often does not cost any more to look up the titles to a hundred pieces of property than it would cost to verify one of the lot, and therein lies the profit of the business to the company, enabling it to do the work at a small expense, while making the cost of insurance almost nominal The company has, however, to employ the highest legal talent in verifying its researches, and to use the greatest care in making its records, for any mistake which might be found to have occurred would fall upon the company, and not on the owner whose title is guaranteed. The company has, however, a cash capital of $500,000 for such purpose, and its board of directors includes some of the wealthiest and best known business men of New York and vicinity. The President of the company is Mr. A. L. Soulard; Secretary, S. B. Livingston; Treasurer, William Wagner; W. R. Thompson, General Manager.

Durability of Cedar.

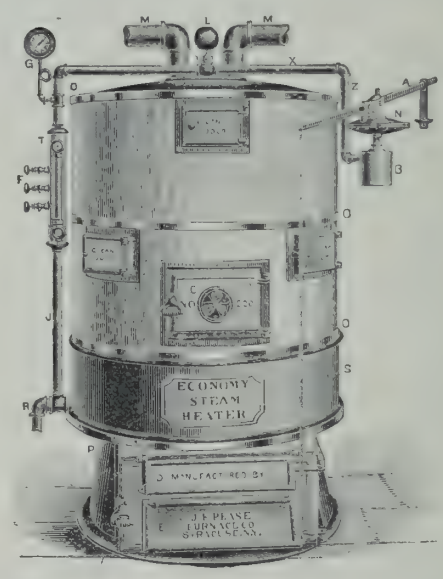
As an instance of the great lasting quality of the Washington cedar, in Whatcom county, near Fairhaven, a fir tree was blown over, which proved by the marks of its annual growth to be over 200 years old, and in the roots of this tree was fastened a cedar log which must necessarily have been lying on the ground when the fir sapling grew over it. The cedar log was recently examined and found to be perfectly sound, and will probably be shipped in its present condition, located in the roots of the fir tree, to the World's Fair. Although cedar shingles have been used in this country for years, no buildings are old enough to test the lasting qualities of the Washington shingle. The two oldest buildings that bear evidence of this are the old building of the Cornwall Company, in the City of Whatcom, which was erected more than forty years ago, the shingles of which were removed recently, and were found in a perfect state of preservation. The next building in age was that built by Judge McGilvra, who was sent to Puget Sound over thirty years ago by Abraham Lincoln. The judge, in removing the shingles from the building when recently torn down, found them to be, so far as rot is concerned, as perfect as they were when they were put on, but somewhat worn from the rain dropping from one shingle to another. Further evidence can be found in the buildings erected by the Hudson Bay Company and the missionaries in Vancouver, over forty and fifty years ago.—*Press-Times, Seattle.*

Tin from Tin Scraps.

The scrap is coated with a film of chloride of calcium or similar fusible salt and heated to redness. It is then cooled by plunging in water, when a scale falls which contains all the tin and leaves the iron practically clean and suitable for many metallurgical processes. The insoluble scale may be smelted direct for tin after mixing with carbon and silicious matter, or it may be heated with sufficient acid, preferably hydrochloric, to dissolve out the iron, leaving the oxide of tin in a nearly pure state, or the tin may be recovered as soluble stannate after fusion of the scale with alkali.—T. Twynam.

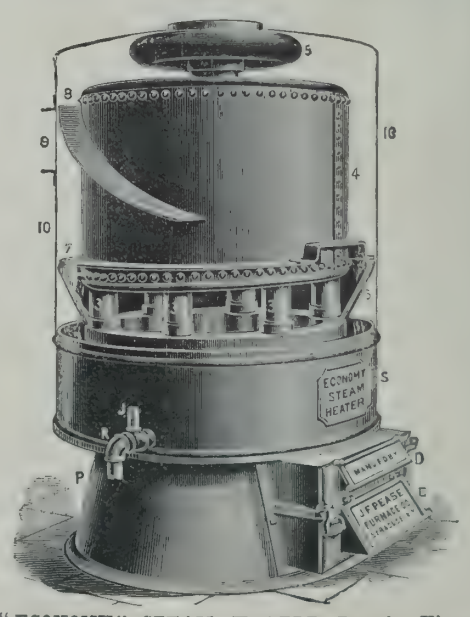
IMPROVED STEAM HEATER.

The accompanying illustrations represent an exterior and interior view of an improved all steam heater, manufactured and recently introduced by the J. F. Pease



"ECONOMY" STEAM HEATER—Exterior View.

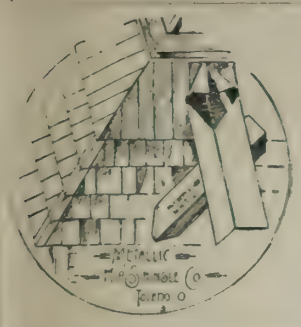
Furnace Company, of Syracuse, N. Y. It is provided with a vertical tubular steel boiler, which is modeled after the boiler used in the construction of a most successful and long popular Combination Heater, heretofore made by this company. The boiler is located directly over the fire-pot, and is arranged to present a maximum amount of heating surface to the fire, or products of combustion. A hollow pot surrounded by the lower cast iron casing rests on the ash-pit in such a manner as to afford ample draught around the inside of the pot, and this pot is kept continually full of water. There is a large air space between the outside of the fire-pot and the lower cast iron casing, to prevent external waste of heat in the cellar. The boiler is connected to the hollow pot by large extra heavy nipple connections, and the water is highly heated in the hollow pot and nipple connections before entering the boiler. The large steam outlet pipe at the top screws into the steam chest over the boiler, to which one or more mains can be connected. The whole upper casing is of galvanized iron, and the top of the heater is made of one heavy piece of cast iron. The products of combustion pass directly upward through the boiler flues (being prevented from passing up the sides by the cut-off plates), and thence down on its outside, to the smoke outlet, deflector plates causing the currents to take a circuitous course and come in contact with the entire exterior surface of the



"ECONOMY" STEAM HEATER—Interior View.

boiler. The boiler may be readily cleaned of deposits and sediment by blowing out, and the flues quickly cleaned of soot deposits by the vertical tubular boiler cleaner, which can be operated over a low fire. These boilers are tested before shipment to eighty pounds steam and hydraulic pressure.

The New "Victoria" Shingle of the Cortright Metal Roofing Co., of Philadelphia, has proved so popular that the company has now prepared to furnish it in a 7 by 10 inch size, in addition to the one size of 10 by 14 inches heretofore made. The smaller size is particularly recommended for ornamental bands, gable ends, towers, etc. It has the same side-lock and top and bottom overlap as have proved so satisfactory in the other goods made by this company.



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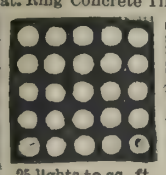
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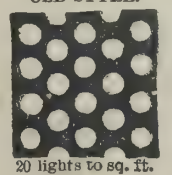
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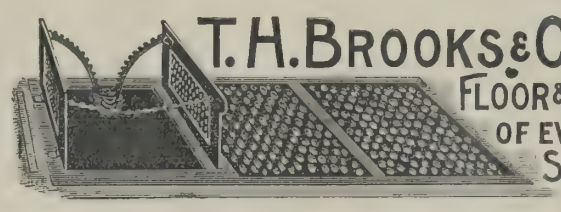
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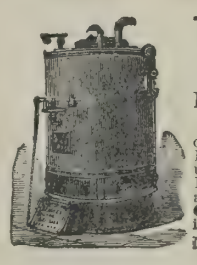


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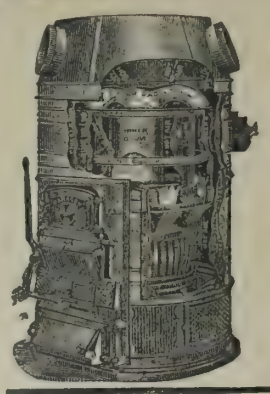
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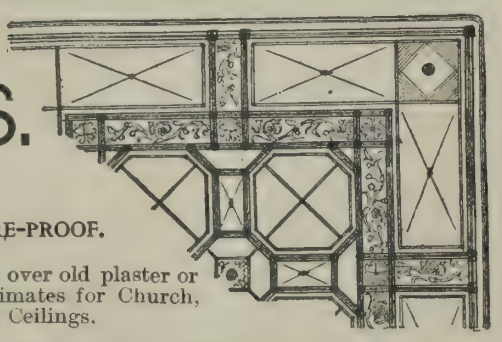
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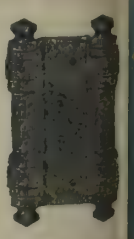
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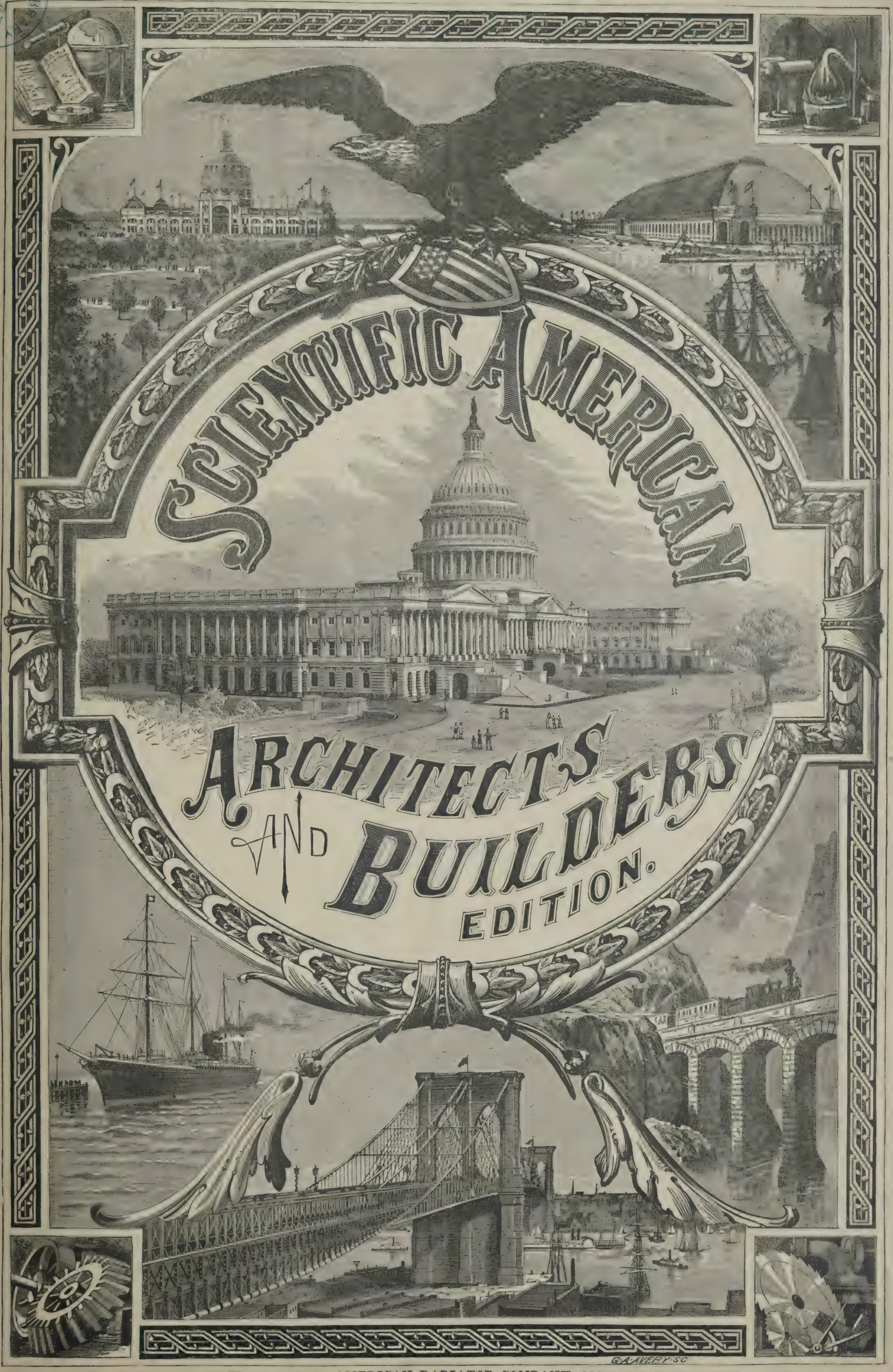
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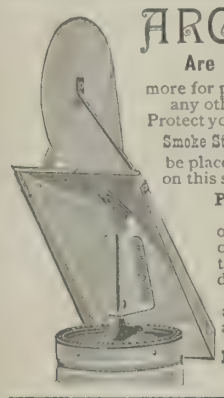
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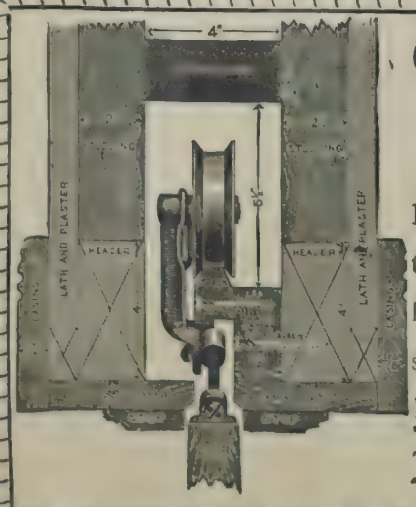
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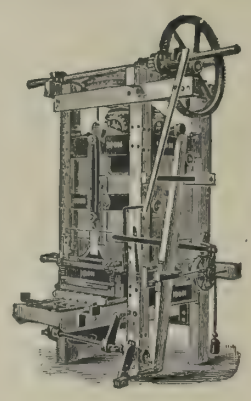
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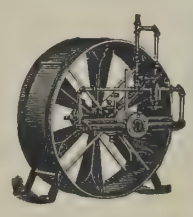
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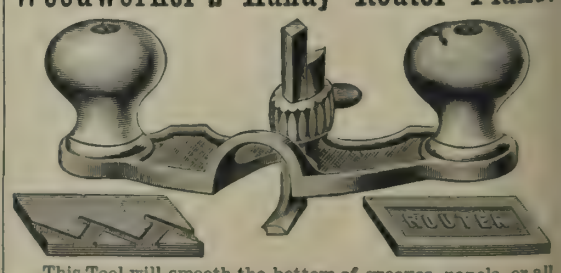
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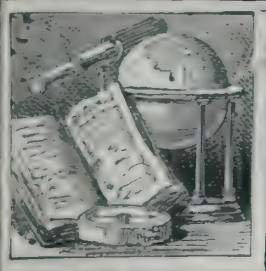
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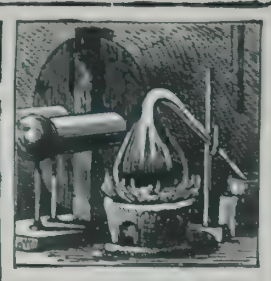


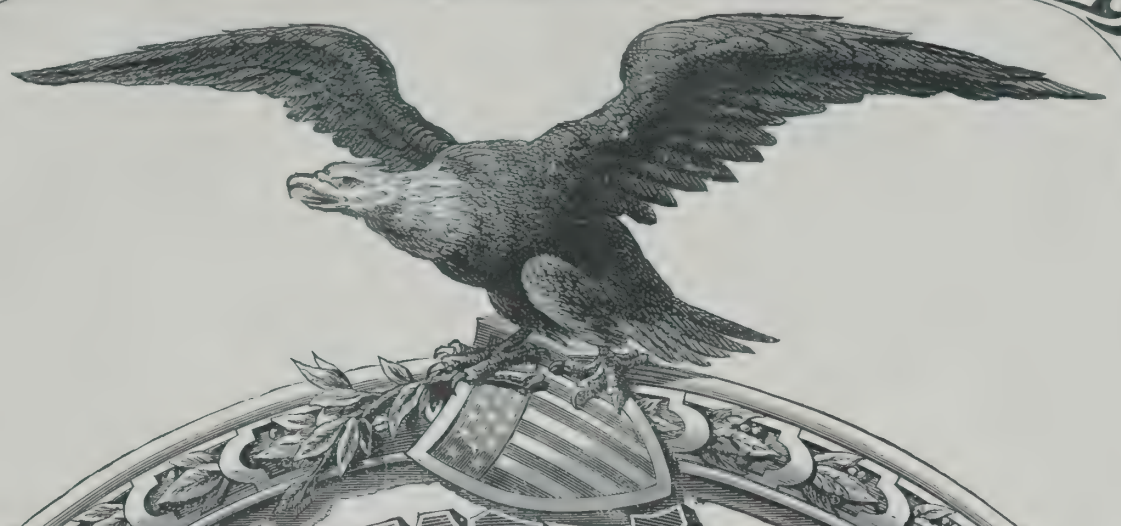
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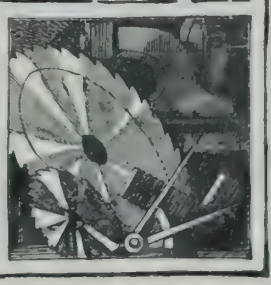
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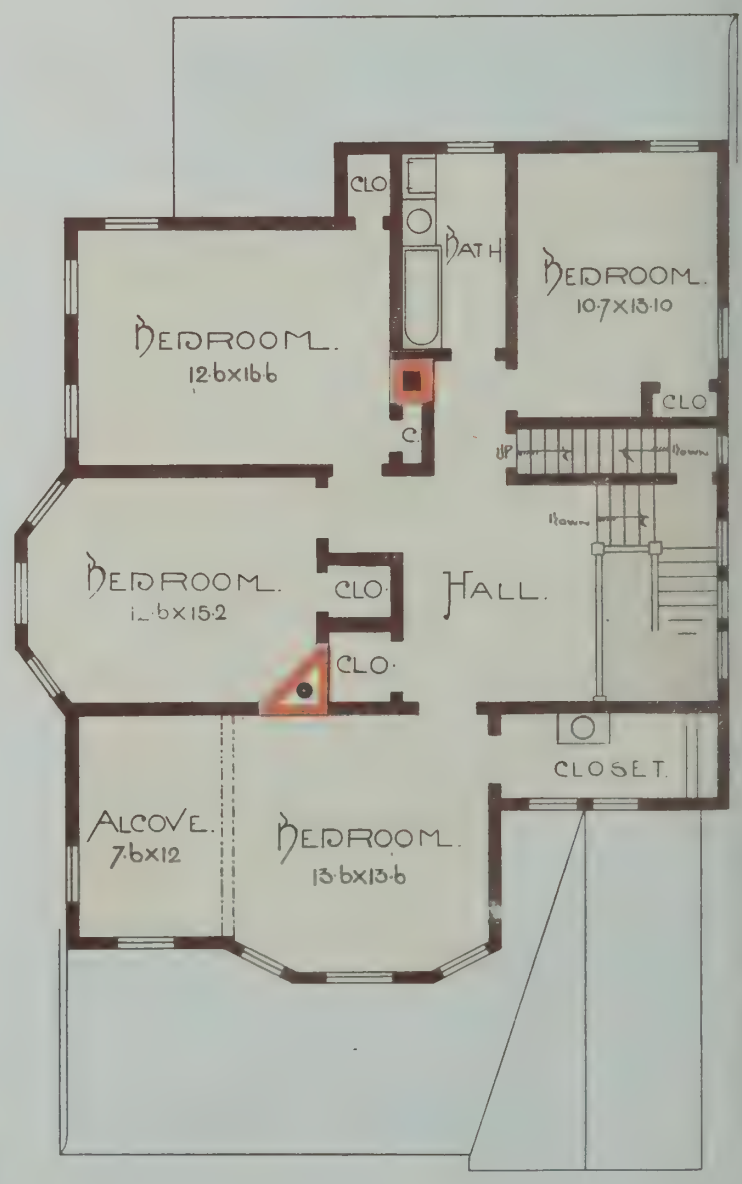


A DWELLING AT BRIDGEPORT, CONN.



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A RESIDENCE AT SPRINGFIELD, MASS.



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ARCHITECTS AND BUILDERS EDITION.

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A DWELLING AT BRIDGEPORT, CONN.—See Page 2.

Scientific American.

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O. D. MUNN. A. E. BEACH.

NEW YORK, JULY, 1893.

THE

Scientific American,

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A RESIDENCE AT SPRINGFIELD, MASS.

One of our colored plates in this issue illustrates a residence recently completed for S. E. Walton, Esq., at Springfield, Mass. The design is pleasing, and it has many bits of detail of interest. The underpinning and stonework around tower at first story is built of Longmeadow stone, with faces left rough as they come from the quarry. This stonework is neatly pointed in red mortar. The remaining part of the building is of wood. The exterior framework is sheathed, covered with clapboards, laid in narrow widths, and painted white. Blinds bottle green. Roof shingled and painted red. Dimensions: Front, 52 ft.; side, 56 ft., not including front piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. Lobby has a tiled floor. The hall, spacious, is trimmed with quartered oak. It contains a nook with a paneled seat, and an elegant staircase with carved newels. Parlor is trimmed with cherry, and it contains a fireplace built of brick and furnished with a tiled hearth and facings, and a hardwood mantel of excellent design. Dining-room and conservatory are trimmed with cherry and bird's-eye maple, library and office with ash, and store-room and rear hall with cypress. Dining room has a paneled wainscoting and a buffet built in with drawers and shelves, inclosed with beveled plate glass doors. The floors in hall, library and dining-room are laid with oak, maple, ash and mahogany, laid in mosaic. Kitchen and pantries are wainscoted and trimmed with white pine. The second floor is trimmed with cypress, finished natural, and it contains five bedrooms, large closets and bathroom, the latter wainscoted with cherry and fitted up replete. The third floor contains one bedroom, besides ample storage. The cemented cellar is divided into three apartments—main cellar, laundry and vegetable cellar. The house throughout is plastered with adamant, and it is provided with water, gas, electric bells, speaking tubes and all the modern conveniences. Heated by the Gurney hot water system. Cost $10,000, including furnace, wall decoration and everything complete.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A DWELLING AT BRIDGEPORT, CONN

One of our colored plates in this issue presents a dwelling recently completed for William H. Fitz Gerald, Esq., on the old King's Highway, Bridgeport, Conn. An additional view is also given on page 1. The perspectives present a unique and tasty appearance, and the plan of the interior is excellent and is finished in the Colonial style. The underpinning is built of rock-faced bluestone. The exterior framework above is covered with clapboards and shingles, and painted pearl gray with darker trimmings. Roof shingled. Dimensions: Front, 37 ft. 3 in; side, 49 ft. 5 in., exclusive of front piazza. Height of ceilings: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The interior throughout is trimmed with whitewood, finished natural. The vestibule is trimmed with oak, and it has a coat closet. The hall is the special feature of the interior. It is finished in antique oak, with paneled wainscoting, hardwood cornice and oak floor. The staircase is separated from hall by ornamental columns extending to ceiling. Between these columns are carved brackets forming Gothic arches. This staircase and hall are lighted effectively by three stained-glass windows. The fireplace is built of Tiffany brick, and it has a tile hearth and an oak mantel with columns and mirror. The parlor is well lighted, and the library has a pleasant nook and a fireplace furnished same as hall. The dining-room, spacious, has a similar fireplace. Butler's closet is provided with drawers and shelves inclosed by glass doors. Kitchen is wainscoted with narrow beaded stuff, and it is provided with store pantry, well ventilated, closet, sink and fireplace for range. There are four bedrooms and bathroom on second floor. The bedrooms are provided with large closets, and the front room has an alcove of good dimensions. Bathroom is wainscoted with oak, and is provided with the usual fixtures. It has exposed plumbing, all nickelplated. Two bedrooms and ample storage on third floor. Cemented cellar contains furnace, laundry and other necessary apartments. Cost $5,300 complete. The steam heater cost $700 more. Mr. J. W. Northrop, Architect, Bridgeport, Conn.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A DWELLING AT CHESTER HILL, NEW YORK.

On page 4 we illustrate a dwelling recently erected for Charles Finn, Esq.; at Chester Hill, N. Y. The building is constructed of the best materials and in a thorough workmanlike manner. Underpinning brick. First and second stories clapboarded and painted pearl gray with darker trimmings. Third story shingled and painted similar. Roof slated. Dimensions: Front, 30 ft. 6 in.; side, 48 ft. 6 in., exclusive of front piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. The interior is cabinet trimmed throughout, and is finished in a very handsome manner. Hall is trimmed with antique oak. It has a paneled wainscoting and ceiling beams. The staircase is provided with massive carved newels, balusters and rail. This staircase and hall have several windows glazed with stained glass. Parlor and library are trimmed with cherry. These apartments have octagon projections, and the latter is provided with an open fireplace, finished with tiled hearths and facings, and a hardwood mantel with mirror. Dining room is trimmed with oak and is wainscoted in panels. Kitchen and pantries are wainscoted, and are furnished with the usual fixtures complete. There are four bedrooms, large closets and bathroom on second floor, and three bedrooms and trunk room on third floor. Bathroom is wainscoted. Cemented cellar contains laundry, furnace and other necessary apartments. Cost $6,850 complete. Messrs. Munn & Co., Architects, New York City, N. Y.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A DWELLING AT MONTCLAIR, N. J.

On page 5 we give views of a dwelling recently completed for Frank H. Syrett, Esq., at Montclair, N. J. The design presents a good example of modern Colonial style, and is well ornamented by many porches, bay windows, balconies and gables. The underpinning is built of red sandstone, with faces left rough, and the exterior above, of wood, is clapboarded and painted olive white with cream white trimmings. The third story is shingled and stained a very dark brown (black) color, with similar trimmings. The roof is also shingled and stained. Dimensions: Front, 34 ft.; side, 42 ft., exclusive of porches. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The interior throughout is trimmed with whitewood, finished natural. Lobby is wainscoted in panels. Hall has a similar wainscot, and it contains an ornamental staircase turned out of ash. This staircase has a spacious landing and carved newels, and is lighted by stained glass windows with good effect. Library is octagonal in shape and is well lighted. Parlor and dining room are separated by double sliding doors, and each are provided with open fireplaces, furnished with tiled hearths and facings, and hardwood mantels. Butler's pantry is fitted up replete. Kitchen is wainscoted and provided with fireplace for range, sink, wash tub, pantry, and rear stairway to main landing and to cellar. The second floor contains a spacious hall, four large bedrooms, closets and bathroom, while the third floor contains four bedrooms, besides ample storage. Bathroom is wainscoted. Cemented cellar contains furnace and other necessary apartments complete. Cost $5,500. Messrs. Munn & Co., Architects, New York.

Our engraving was made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

COTTAGES OF LOW COST.

We publish on page 6 floor plans and an engraving showing two designs of cottages, recently erected for D. H. McKay, Esq., at Boston, Mass. The underpinning is built of local stone, well bonded and pointed on the exterior. The framework is sheathed and then covered with paper. The first story is clapboarded and painted Colonial yellow, with white trimmings, and the second and third stories are shingled and stained sienna. Roof shingled and painted red. Dimensions: Front, 19 ft. 6 in.; side, 28 ft. 6 in., exclusive of front and rear porch. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. The interior throughout is trimmed with whitewood, and finished natural. Hall contains an ornamental staircase, with newel, balusters and rail turned out of similar wood. Parlor has a wood mantel of neat design. Living room is fitted up complete. The sink is placed in pantry, which is large, well lighted, and provided with drawers, cupboards and shelves. There are two large and two small bedrooms on second floor. The third floor, or attic, contains ample storage. Cemented cellar under whole of building. Cost $1,600, estimated. This dwelling could be built for less in some localities. Austin W. Pease, Architect, Boston, Mass.

Our engraving was made direct from a photograph of the buildings, taken specially for the SCIENTIFIC AMERICAN.

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A STONE RESIDENCE AT ST. DAVID, PA.

On page 7 will be found engravings and floor plans of a residence erected for George W. Childs, Esq , at St. David, Pa. The engravings present a very attractive design for a stone house, and the plans show a roomy interior. The building is constructed in a substantial manner. It is built of Chestnut Hill granite, laid up in a rough manner, with the exception of part of first, second and third stories, which are covered with shingles and stained mahogany color. Roof slated. Dimensions: Front, 40 ft. 6 in.; side, 51 ft. 6 in., not including front piazza. Height of ceilings: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft. 6 in.; third, 8 ft. 6 in. Lobby is paneled with oak. The doors and windows have beaded casings and carved angle blocks. The hall is trimmed with oak. The broad, low staircase with carved newels and paneled divan are the features of hall. This staircase is lighted by a cluster of stained-glass windows. Reception room is treated with ivory white, and is separated from hall by a ornamental transom. Parlor, spacious, has an open fireplace built of stone, with hearths and facings of same, and provided with carved oak shelf over mantel. Dining-room is provided with two china closets, furnished with beveled plate glass doors. Kitchen and laundry are wainscoted and trimmed with white pine, finished natural. Kitchen is fitted up with fireplace for fire range, dresser, butler's closet complete, and servants' stairway to main landing. Laundry is provided with wash trays. Hardwood floors. The second and third floors are trimmed with white pine, wood. Hall and parlor are treated in ivory white. The staircase with its arcaded effect, formed by the newel extending to ceiling post, with spindle balusters and transoms, is the principal feature of hall. This staircase is lighted by a stained glass window, with good effect. The bay window is provided with a paneled divan. Dining room is finished natural. The fireplaces have facings and hearths of enameled brick, and wood mantels, treated to correspond with the trim of each room respectively. The floors are of hardwood. Kitchen is wainscoted and provided with fireplace for range, sink, butler's closets, servants' dining hall and pantry, all fitted up in the best possible manner. The second floor is trimmed with white pine and is treated in the delicate shades of green, blue, pink and white. This floor contains four bedrooms, large closets and bathroom, the latter wainscoted with white English tiling and furnished complete. There are four bedrooms on third floor besides ample storage. Cemented cellar, contains furnace and other necessary apartments.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT BELLE HAVEN, CONN.

We present on page 8 a residence recently completed for E. S. Nash, Esq., at Belle Haven, Conn.

The design is unique. It has a spacious and well shaded piazza, balconies and dormer windows. The entrance porch, separated from family piazza, is a good feature. finished natural. Second floor contains five spacious bedrooms, three of them communicating, all well lighted, and every one opening into hall; nine closets and bathroom. Bathroom is wainscoted and furnished in the usual manner. Third floor has two bedrooms, two closets and trunk room. Cost $7,600. Messrs. F. L. and W. L. Price, Architects, 731 Walnut street, Philadelphia, Pa.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A DWELLING AT BELLE HAVEN, CONN.

The engravings on page 9 illustrate "Lafayette Cottage," erected recently for Henry H. Adams, Esq., at Belle Haven, Conn., and from plans prepared by the proprietor. The building is designed throughout in the old Colonial style. The elevations are picturesque and the interior arrangement is complete. The main lines are well broken by several bay windows, a spacious piazza, and a porte-cochère. The underpinning is built of rock faced bluestone, laid up random ashlar. The building above is of wood, and the first story is clapboarded on the exterior, and painted Colonial yellow with ivory white trimmings; second story is shingled and left to weather finish. Blinds are painted bottle green. Roof shingled and finished natural. Dimensions: Front, 37 ft.; side, 51 ft., exclusive of piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. The first floor is trimmed throughout with white-

THE WORLD'S COLUMBIAN EXPOSITION.

We present herewith a bird's-eye view of this most wonderful of all the industrial expositions thus far realized in the history of the world. This vast array of palaces seems almost to have sprung from the earth as if by magic. Buildings which in ancient times would have required an age to erect have been made to rise, brought into finished condition, stored with priceless treasures of industry, and opened to crowding throngs of the people, all within the period of a few weeks. The most lively descriptions of ancient magical romance have been here surpassed.

Beginning at the extreme lower corner of our engraving, at the left, we have a portion of the Forestry Palace; next comes the grand pier, where the steamboats,



BIRD'S EYE VIEW OF THE WORLD'S COLUMBIAN EXPOSITION—LOOKING WEST.

The underpinning is built of brick with stone foundation. The superstructure above is built of wood. The first story is clapboarded and the second story shingled, and all is painted light olive green, with bottle green trimmings. The columns to piazza are of hardwood, finished natural. Roof shingled and stained moss green. Dimensions: Front, 41 ft.; side, 41 ft., exclusive of piazza. Height of ceilings: Cellar, 8 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. The main hall is handsomely finished in quartered oak, and the walls are wainscoted and elaborately paneled. The broad, low staircase, antique mantel and paneled divan are the features of hall, while the old casement windows effect, seats and nooks in parlor and dining-room are in keeping with the several spindle transoms and leaded windows. The fireplace is built of Tiffany brick, with hearth and facings of same. The arcaded effect between parlor and hall, produced by the Colonial columns extending to ceiling, is quite a feature, giving a very attractive vista. Parlor and billiard room are trimmed with cherry, the former having a fireplace with tile trimmings and a hardwood mantel. Bookcases are built in on either side of fireplace. Billiard room has a paneled wainscoting and fireplace furnished similar. Dining-room is trimmed with antique oak and is wainscoted in panels. The fireplace is furnished same as the ones already described. China cabinets are built in, with doors glazed with beveled plate glass. The floors are of oak laid in narrow widths. Butler's closet is bringing passengers from Chicago and other ports on the great lakes, land their passengers. At the head of the pier is seen the Agricultural Palace; back of that is the Machinery Palace; at the right thereof is seen the dome of the Administration Palace, in the rear of which are the railway termini. Across the basin, and opposite the Agricultural Palace, is the Palace of Manufactures and the Liberal Arts, with its broad front toward the lake. The structures in the rear of this are, first, the Palace of Electricity; second, the Palace of Mines, and back of these the Palace of Transportation. At the right of the Palace of the Liberal Arts is the United States Government Building, and beyond that, still at the right, the Fisheries Building; back of these is the wooded island, where Horticulture is exhibited in all its glory, and back of the wooded island, fronting on an expanse of water, is the Palace of Horticulture. At the extreme left of this Palace is the Choral Hall, and at the extreme right the Women's Palace, back of which will be noticed a large number of dome-like buildings, occupying the famous Midway Plaisance, where the Architecture of all countries is so beautifully represented. At the right of the engraving is seen the Art Galleries, and the various buildings adjacent thereto are the different State buildings, many of which are superb examples of architecture.

The Palace of Manufactures and Liberal Arts occupies a space of about 30 acres. Its form is rectangular





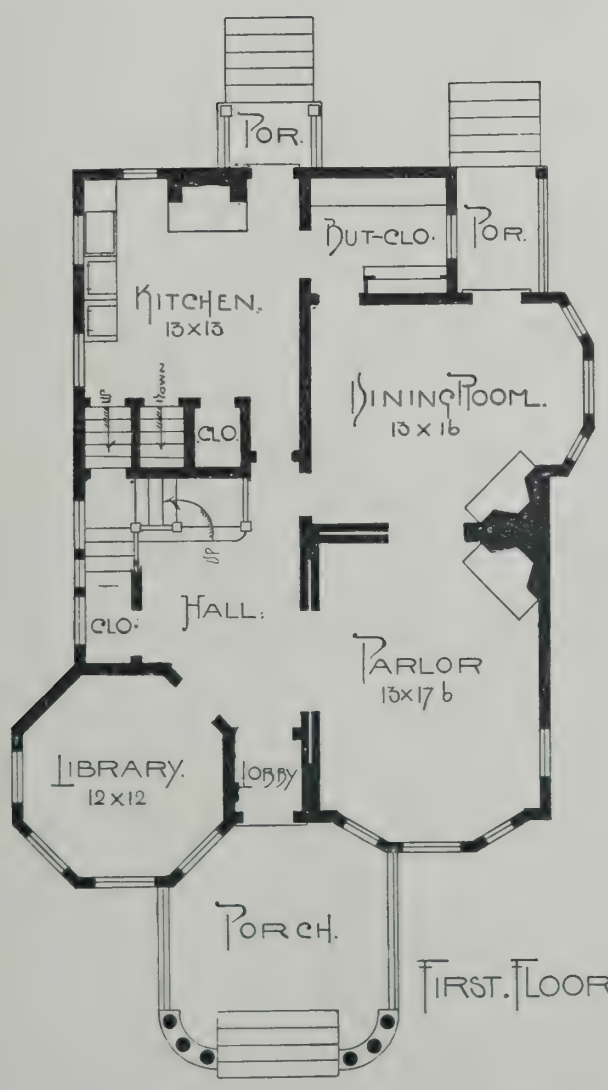
A DWELLING AT CHESTER HILL, N. Y.—See Page 2.











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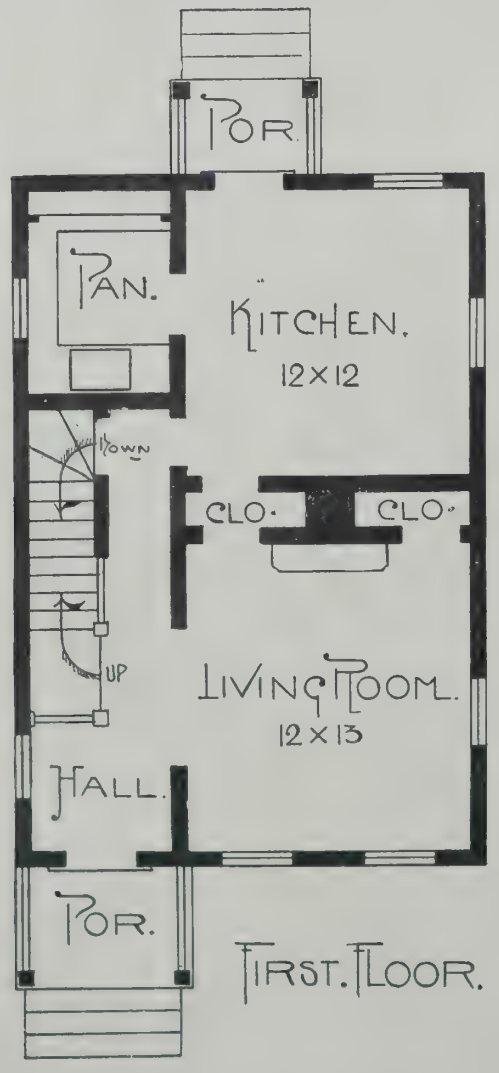


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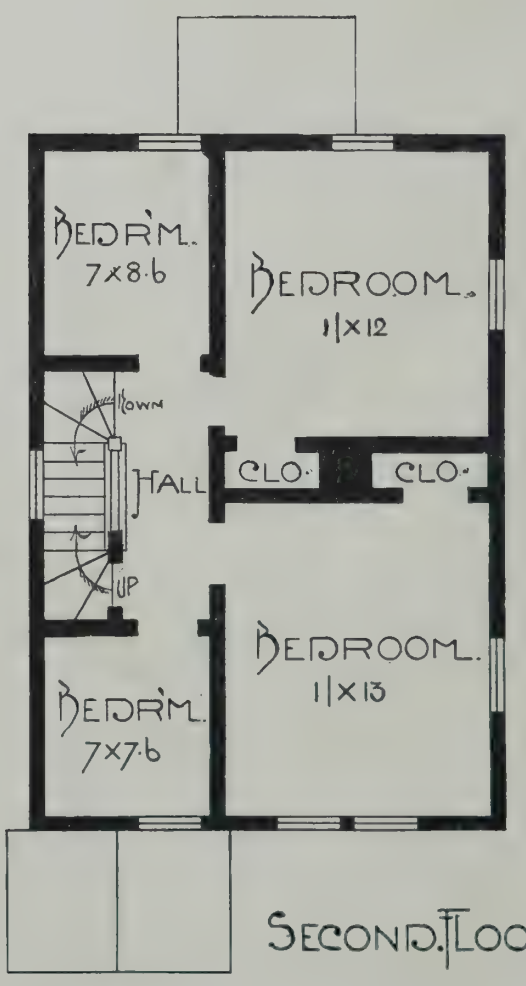
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A DWELLING AT MONTCLAIR, N. J.—See Page 2.





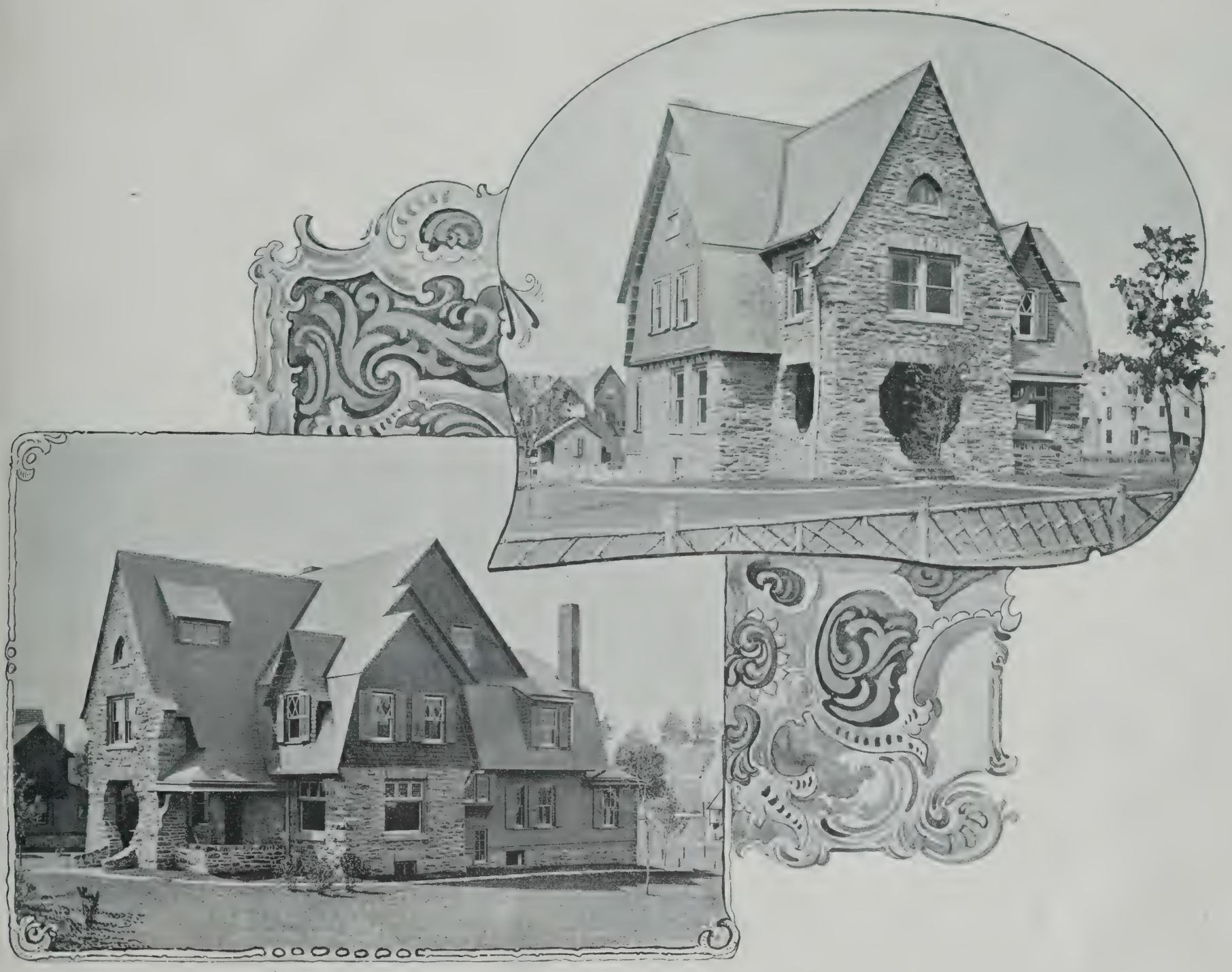
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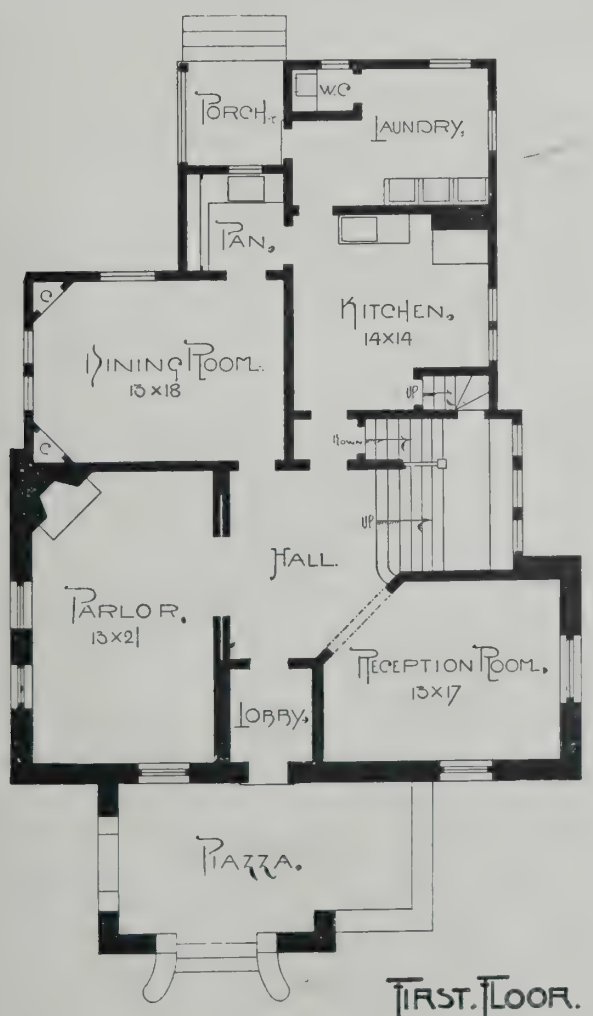


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COTTAGES OF LOW COST.—See Page 2.





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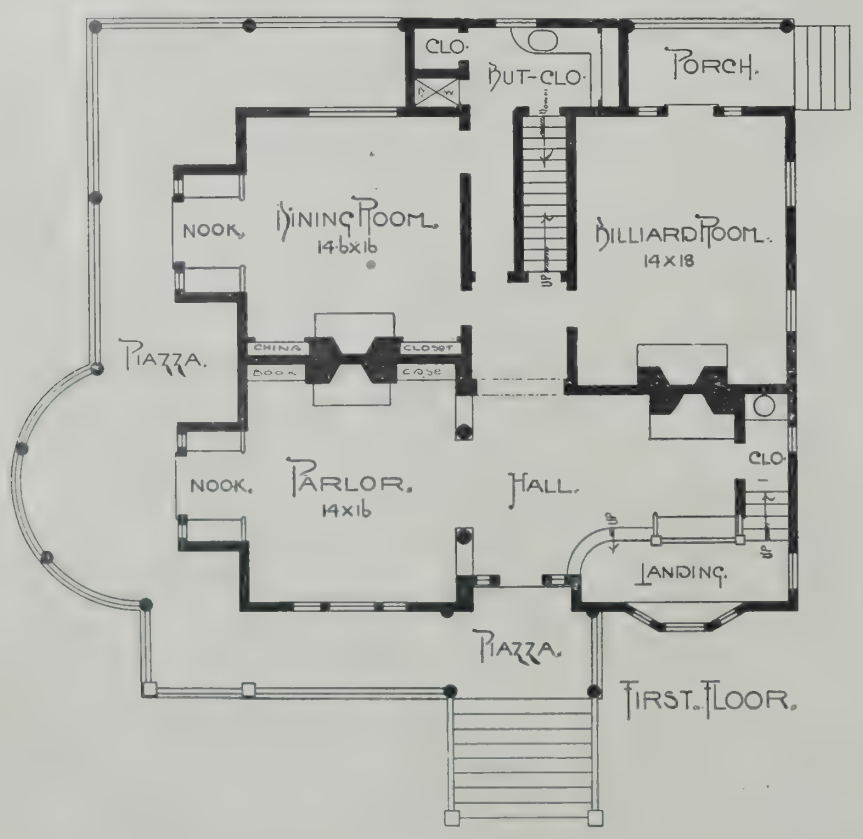


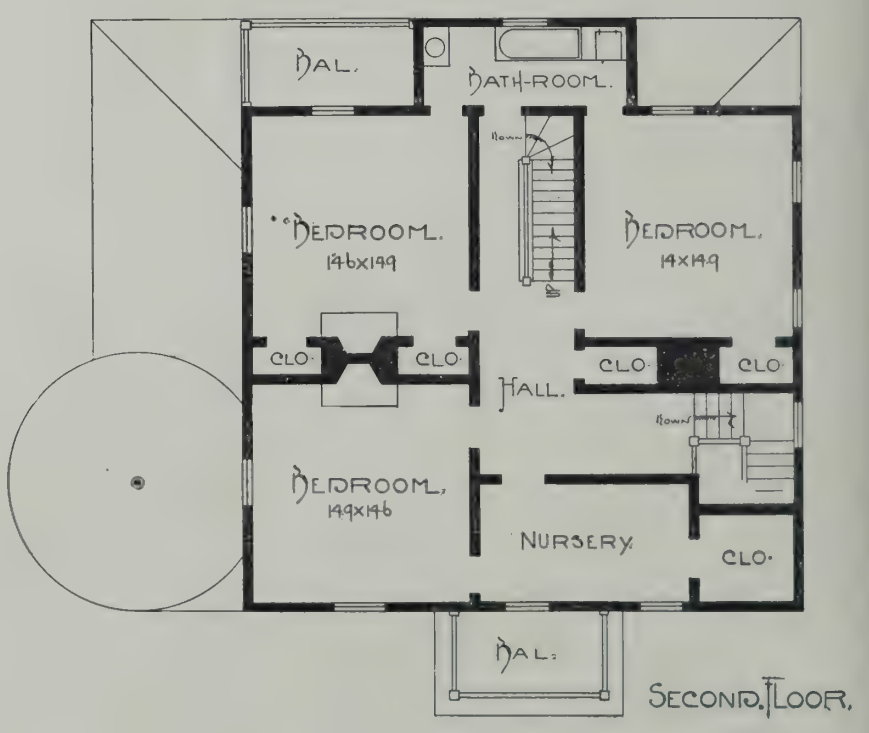
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A STONE RESIDENCE AT ST. DAVID, PA.—See Page 3.

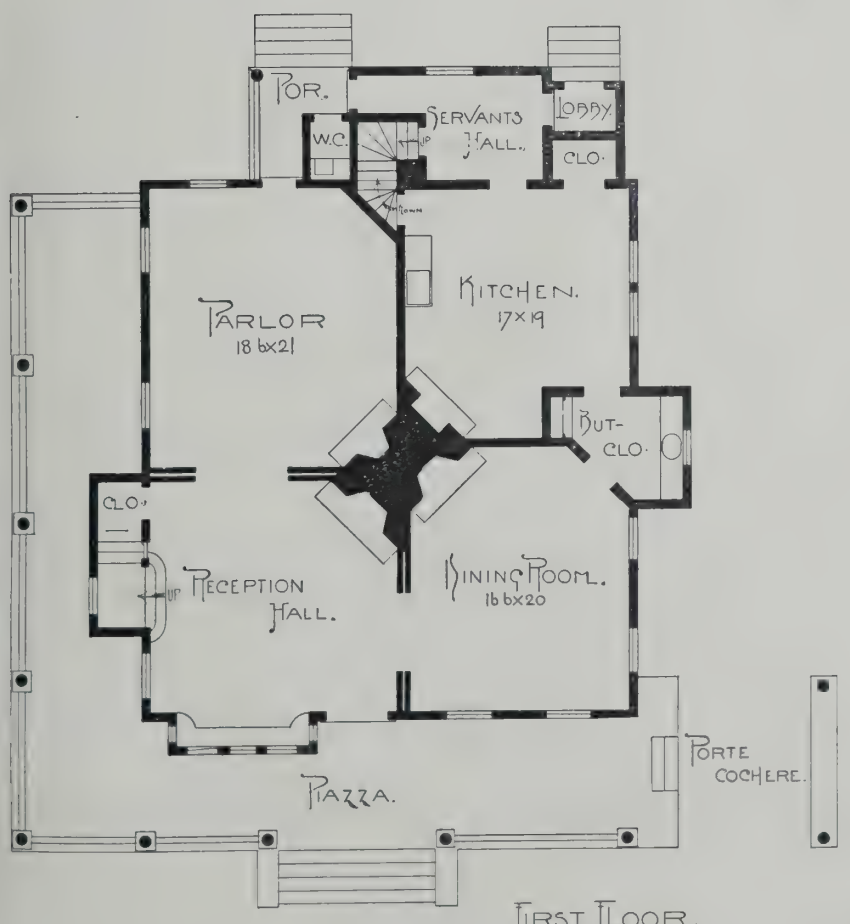






A RESIDENCE AT BELLE HAVEN, CONN.—See Page 3.





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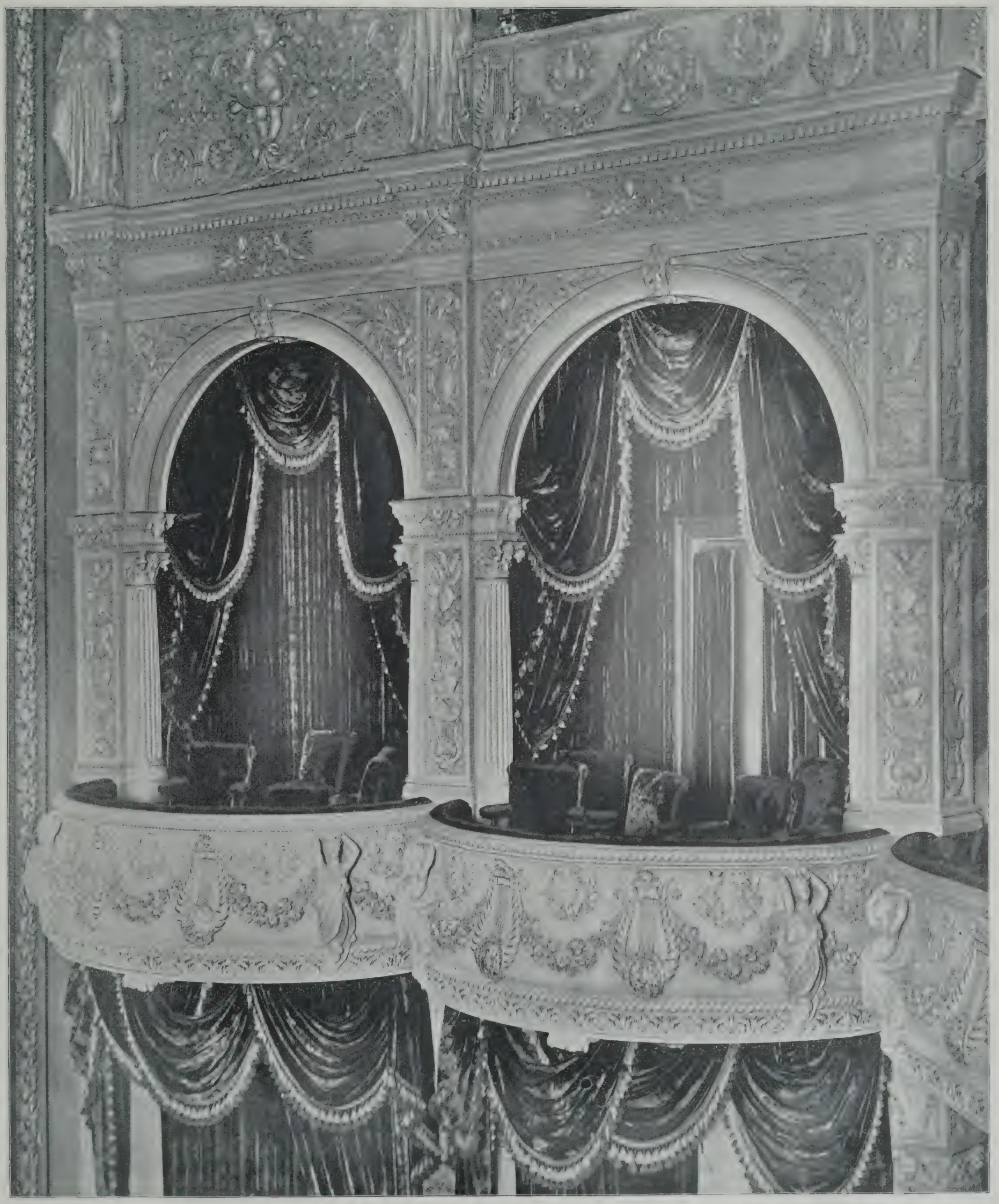
A DWELLING AT BELLE HAVEN, CONN.—See Page 3.



THE FIFTH AVENUE THEATRE.—THE GRAND DOME.—Francis H. Kimball, Architect.

DECORATION BY MESSRS. ARNOLD & LOCKE. PLASTER WORK BY MESSRS. J. & J. MORRISON.

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THE FIFTH AVENUE THEATRE.—THE PROSCENIUM BOXES.—Francis H. Kimball, Architect.
DRAPERIES BY MESSRS. LORD & TAYLOR.

and the central hall is covered with a glass roof, 260 feet in height, and is surrounded by two circular galleries each, more than 3,000 feet in length.

The Coliseum was capable of containing 80,000 spectators, while 150,000 might move about in this edifice of Corinthian style.

The architect of this gigantic structure is Mr. George B. Post, of New York. It does great honor to his genius.

The Women's Palace, constructed in the style of the Italian Renaissance, is exclusively reserved for the beautiful sex. The architect is Miss Sophie Hayden, a pupil of the Boston School of Technology. It is 400 feet in length. The lagoon opposite this palace forms a bay nearly 430 feet in width.

(*Continued in next Number.*)

The Fifth Avenue Theatre,

NEW YORK CITY.

BY HENRY M. STEVENS.

The beautiful photographic illustrations of this elegant edifice are herewith continued from our June number. We come now to the grand dome. The tympani, or dome panels, are treated in color, the Muses having been appropriately selected as the subjects.

These figures have been drawn with great care, displaying in their color scheme such excellent judgment, such a nice sense of values, as serve to enhance the deft technique, which in itself lifts them above the average work of this class devoted to the same purpose

The effect of the boxes, proscenium arch and dome from the parquet is unusually attractive and impressive. The highest part of the stage front seen from the auditorium is that of the stage proper. The height of the floor of the rigging loft is seventy-four feet from the stage, which, with the loft, carries up that part of the structure far above the auditorium roof, the portico roof serving the purpose of a fire-escape from the balcony foyer, and the balcony projecting out under the upper windows being the fire-escape for the gallery.

Here is the same richness of detail noticeable in the decoration of the exterior. Nothing has been subordinated to any other portion. One feature is the relative of all the other parts, as much as the entire *ensemble* is the complement of each, the finale of all being the grand dome. The key to the tone of the interior is ligh'ness—brilliancy. Relieved by the warm tints in the plain wall surfaces—a delicate, pinkish terra-cotta, with a border in pure white, classical in motive and light and frostlike in effect—this decorative scheme begins at the bottom in strong tones, grows lighter at each stage or tier, and, ending in the dome in the blue backgr.und of the tympani, presents such contrast to the strong reds in carpeting, upholstering and drop curtain in plush, forty feet wide and forty-one feet high, that the observer cannot otherwise do else than acknowledge the beauty of such a *coup d'œil.*

The relief ornamental work and mouldings are treated in old ivory, the high lights being emphasized by a most liberal and charming application of gold leaf, bronzes being carefully avoided, and all colors being rendered in oil. Ample and richly decorated foyers over the Twenty-eighth Street grand f yer, in both balcony and gallery, sustain the thoroughness with which the whole interior gives evidence of having been planned.

Casement windows in stained glass on both the balcony and gallery floors are an especial feature of these foyers, and permit exit to the balcony fire-escapes. All the sight lines of the auditorium are admirable, the distance from the footlights to the rear being less than the width of the auditorium, and consequently avoiding any effort on the part of the performers on the stage in being audible to the audience assembled.

The beautiful decorations in color and stained glass were designed and executed under the direction of Mr. Alexander S. Locke, of the firm of Messrs. Arnold & Locke, and the talented pupil of the distinguished artist, Mr. John La Farge, of this city.

In Brooklyn, where Mr. Locke's studio and offices are situated, some of his most successful contracts have been executed, notably the Columbia and Park Theatres there, Holmes' Star Theatre and the Academy of Music. Besides the Fifth Avenue Theatre, Harrigan's Theatre was also decorated by Mr. Locke, while the Middletown Music Hall, at Middletown, Conn., and Gilmore's Court Square Theatre, at Springfield, Mass., are among his other theatrical contracts. St. Augustin's Roman Catholic Church in Brooklyn, and All Saints' Roman Catholic Church in Harlem, and other prominent edifices in Brooklyn, are illustrations of the attractiveness of his ecclesiastical work.

With regard to the effect of the Renaissance treatment as applied to a theatre interior, there can be little doubt of its appropriateness, if the Fifth Avenue is to be taken as an example.

No style of decoration was ever better adapted for the portrayal of the abundance of nature, of her infinite variety and beauty, and, therefore, of a reign of plenty, into which enters every conceivable pleasure, than that of the Renaissance; for it is typical of all these features, so significant of intellectual and commercial prosperity, the two most important stimuli for a Renaissance in art.

It is hardly necessary to indicate that it is the particular province of the drama to portray the same thing, to teach the same philosophy. Mr. Locke has very cleverly interpreted all this. The stage is so great, so full of magical effect, and in its lighter moods has such a boundless overflow of audacity and beauty, that it is in harmony with just such a phase of art as that with which he has sought to place us in correspondence.

The Orchestra Chairs.

What the late George William Curtis so felicitously expressed with regard to the comfort, the luxurious character, of his chair at "Wallack's Theatre" is equally applicable to the seats at the present "Fifth Avenue Theatre."



THE FIFTH AVENUE THEATRE.—ORCHESTRA CHAIRS.

BY THE ANDREWS-DEMAREST SEATING COMPANY.

"An old play-goer," said Mr. Curtis in the "Easy Chair" of *Harper's Monthly*, of March, 1887, "easily falls into such reminiscences as he seats himself, on a winter evening, in Wallack's Theatre, the most tasteful, refined, and comfortable of the play-houses of to-day.

"He joins the throng that enters quietly the handsome lobby, and, received by the well-dressed, well-mannered usher, is shown to his seat in the parquet, the ancient pit no longer separate, but occupying all the lower space of the house. His chair is delightful. There is plenty of space for his neighbors to pass, and the slope of the floor enables him to defy all but the most towering edifices upon the female head. He wonders whether any seat in any theatre in the world is more comfortable than his chair at Wallack's."

The chairs in the "Fifth Avenue" were, in some respects, practically made with especial reference to their introduction into that theatre. In many technical details they differ from the Wallack chair in construction, and in point of comfort are superior to it. There have been recently many features added to the attractiveness of a theatre chair, which, four or five years ago, were unheard of, and their convenience renders them now of paramount importance.

The chairs under consideration are furnished with hat-racks, coat-racks or holders, and foot-guards that prevent a man's hat being disturbed by his neighbor behind him. They have a movable or tilting back, have tufted upholstered backs, and are of crimson brocaded velvet, the arms being also upholstered, like the backs and seats, in crimson velvet.

When the seat is folded the back assumes a perpendicular position, and when the seat is lowered the back recedes to its proper incline for the occupant. The back, while connected with the seat, is also free to be moved forward, even when the seat is lowered. The iron standards are extra heavy, and of unusually effective design.

Manufactured by the Andrews-Demarest Seating Co., a consolidation of C. B. Demarest & Co. and the seating department of the Andrews Manufacturing Company, they exhibit all the features of the superior workmanship of that well-known manufacturing plant, which is well organized, and has its factory in Kent Avenue, near Grand Street, Brooklyn.

The ironwork of the company is made from the very best brands of pig iron; the screwholes in the castings are all drilled and countersunk, instead of being cast in, thus causing the screw to fit the iron much better and take a firmer hold in the wood; while its wood frames, arms, tops, etc., are always made from the very best stock, well seasoned. It also makes all its own veneer work, using only superior stock, kiln dried, and the best brands of glue. The upholstery is also done on the premises of the company.

The new consolidation has, consequently, an equipment that must insure for it equal success with that which it has secured by its contract in the "Fifth Avenue."

Draperies and Portieres.

It is always gratifying to recognize in the productions of old-established firms the retention and energetic exercise of those powers by means of which their original reputation was obtained, and it is, consequently, a matter of no surprise to find that, among all the specimens of admirable workmanship which the interior of the theatre exhibits, none displays more quiet and excellent taste in decoration, alike in color and in form, than the graceful designs in drapery furnished by Messrs. Lord & Taylor. The private boxes, particularly, are distinguished by a warmth of tone in their contrast to their surroundings, and a felicitous adjustment of lines in the arrangement of the hangings, that render them features of special significance in the general decorative scheme of the auditorium. When this superb picture of the theatre interior is illuminated by the effective method observed there, the *ensemble* of colored dome, classical bas-reliefs in old ivory, and glittering electrical lights, tempered by the soft medium of ground glass, finds its relief in the rich, glowing contrast of curtain and lambrequin in crimson plush. The portières to the various doorways, the immense drop curtain in plush, and the upholstering of the seats, and the carpeting of the aisles being all in crimson, a life and gayety are given to this presentment of art and architecture, the like of which it would be impossible to duplicate in any other place of amusement in the city. The French have so long been identified with excellence in the specialty of upholstery, and have set the styles in this direction with such unquestioned right, that their influence has always had most weight in determining the choice of selection in the application of style to subject. Of late years, however, greater latitude has been taken with French originals on this side of the Atlantic, so that the designer can lend more variety to the motive of his design, and subordinate or amplify certain features with perfect freedom, and yet keep within the boundaries of good taste. This is exemplified in the examples under consideration; for, while they adhere in a measure to conventional methods, they diversify them by certain graceful innovations, which are as charming in effect as they are skillful in execution. In other words, the designers in this case prove that they have ample resources, and are never at a loss for novel ideas.

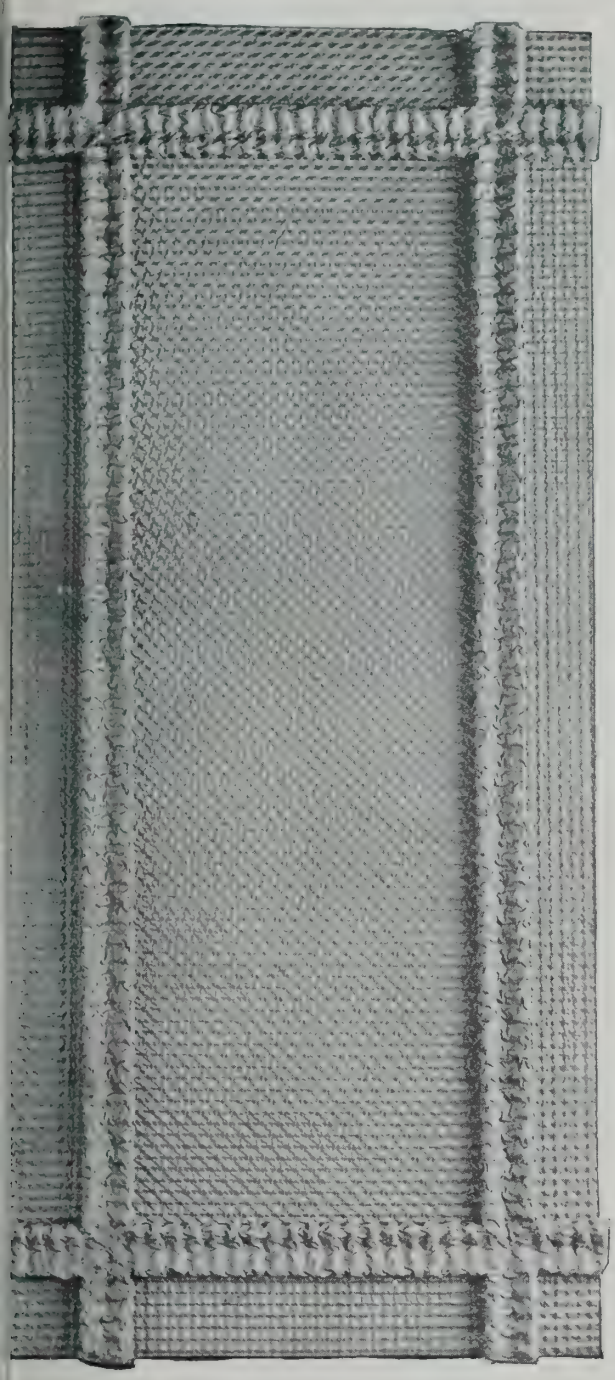
(*To be continued.*)

A Change in Name.

The Capitol Heater Company, of Detroit, have made application to change the name of their corporation, and they will in future be known as the United States Heater Company, of the same city. They have acquired the business in Bolton hot water heaters so successfully prosecuted during the past few years by the Detroit Heating and Lighting Company. This company at present controls the original Bolton heater, as well as the Capitol hot water heater, and will in due time have a complete line of steam boilers. The officers of the United State Heater Company, Messrs. Henderson and Smith, are well and favorably known by reason of their long association with the Detroit Heating and Lighting Company, and it is generally admitted that much to their enthusiastic efforts is due the very prominent position which the Bolton heater holds to-day in the eyes of the trade.

A TUFTED METAL CEILING.

An absolutely new design of tufted ceiling is represented in the accompanying illustration. It has a substantial appearance and one which people of good taste would select, for its clear outlines make it very handsome and easily decorated, and when properly done has no equal. Metal ceiling is rapidly gaining in favor for large and public buildings, banks, hotels, business offices and all

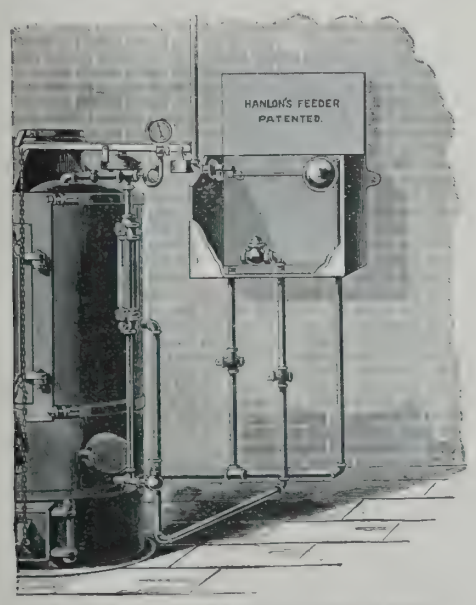


A TUFTED METAL CEILING.

such structures, the durability undoubtedly being the main reason, as there is no danger of plaster falling off When once erected, it stays perfectly firm until taken down; and then, the capabilities of elaborate decoration are greater. This design is one of five new ones just out by the Garry Iron and Steel Roofing Company, of Cleveland, Ohio.

HANLON'S AUTOMATIC BOILER FEED.

The boiler feed attachment shown in the illustration consists of a tank furnished with two valves: an automatic float valve connected with the water main and regulating the supply of water to the tank, and a check



HANLON'S AUTOMATIC BOILER FEED.

valve at the bottom of the tank connected directly with the boiler. The check valve is governed by the flow of water into the boiler and by steam pressure from the boiler. When the steam pressure is off or very low, and the height of water in the boiler is below the pre-established level, the water in the tank, seeking its proper level in the boiler, forces the check valve open, admitting water to the boiler. The supply valve maintaining the same level of water in the tank, the flow through the check valve will continue until there is a corresponding level of the water in the boiler, when the check valve closes, preventing backward pressure from the boiler from forcing the water back into the tank. The check valve is closed while the clean water is about it, so that it is impossible for anything to get between the valve and its seat to clog it.

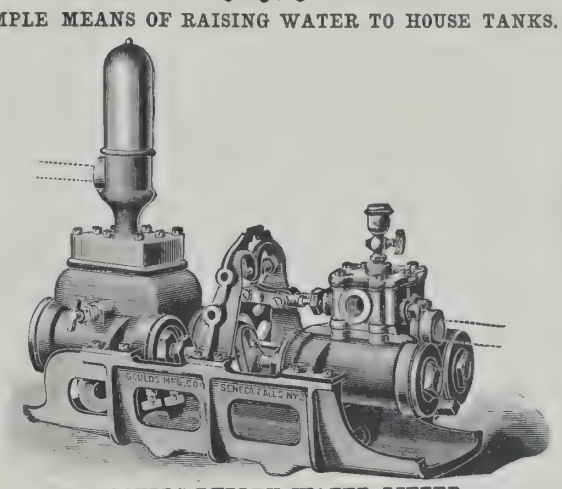
The apparatus is an attachment, independent of the boiler, and not subjected to heat. A wire gauze screen connected to the inlet valve prevents foreign matter from entering the tank from the main. If so desired, the pipe connecting the apparatus with the boiler may enter the boiler ten or twelve inches, say, below the established level. Thus, even assuming the remote contingency of the check valve becoming accidentally stopped and prevented from closing tightly, yet the water could not be forced from the boiler below this point of connection.

This improved boiler feed does away entirely with the necessity of trusting to attendants, who are so likely to become negligent in the matter for supplying fresh water to the boilers.

Further information relative to the improvement will be furnished on application to the Hanlon Manufacturing Co., Pennington, N. J.

FRENCH ingenuity has contrived an improved stone-cutting saw of remarkable efficiency—a circular saw having its edge set with black diamonds in the same way as the straight blades; but as the strain on the diamond is all in one direction, the setting can be made much firmer.

SIMPLE MEANS OF RAISING WATER TO HOUSE TANKS.



THE GOULDS DUPLEX WATER LIFTER.

A system by means of which the water pressure of any ordinary water supply works may be made to supply an elevated house tank for domestic use is represented in the accompanying illustrations, as provided by the Goulds Manufacturing Co., of Seneca Falls, N. Y. It includes a form of pump styled by the company the Duplex Water Lifter, to be located over a kitchen sink or other convenient place, and connected by piping, as shown in the diagram, the lifter being operated by city pressure and elevating the exhaust to a point above, while the pump takes suction from a cistern and discharges to a tank in an upper story. An automatic float valve may be placed in the tank to shut off the water from the lifter when the tank is filled, or by similar means the lifter may be controlled from the power end.

By means of this system, as will be seen, the need of a separate gas, hot air, or other form of engine is done away with, the duplex lifter being successfully worked by a pressure as low as ten pounds per square inch, or the equivalent of a twenty foot head, which is exceeded in almost every water works supply system.

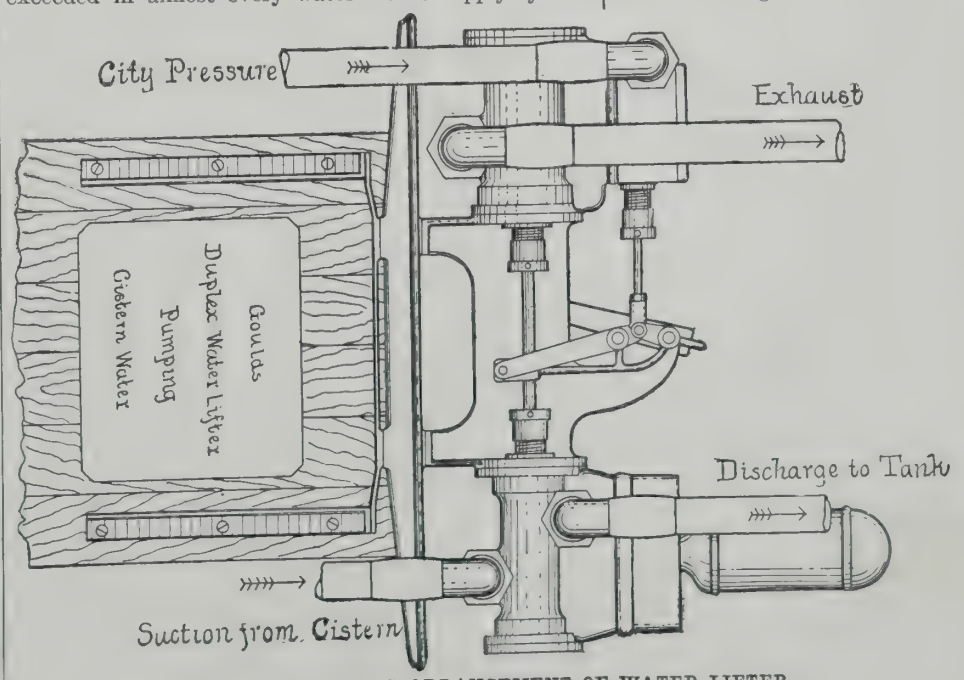


DIAGRAM SHOWING ARRANGEMENT OF WATER LIFTER.

Those interested enough to desire further details should write the company for a copy of their recently issued illustrated catalogue on this subject.

COPPER STATUE, "FLYING DUTCHMAN."

The accompanying illustration represents a statue recently completed for the Columbian Exposition exhibit of the Moline Plow Co. It was made by W. H. Mullins, of Salem, Ohio, some of whose remarkably fine representations in sheet metal work have heretofore been illustrated in these columns. The statue is made of heavy copper, and is mounted on a copper stump six feet in height, the whole figure, including the stump, being eighteen feet in



COLUMBIAN EXPOSITION—"FLYING DUTCHMAN" (Trademark) OF MOLINE PLOW CO.

height. The ear of corn is perforated and arranged so that an electric light inclosed in it will shine through the openings. The cut is an exact representation, being taken from the finished figure, and shows the statue in every detail. The proportions of the statue were intended to be somewhat absurd, to form rather a "taking" burlesque.

GUNTER'S chain, used in measuring land, was invented by Edmund Gunter in 1606.

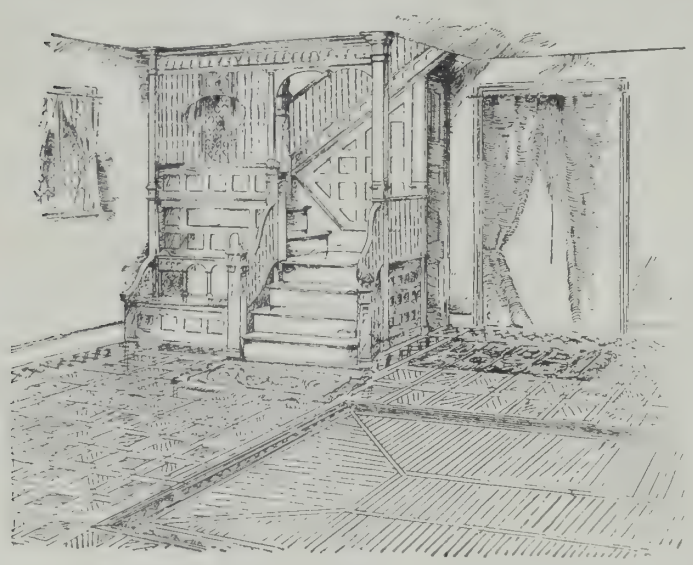
THE Pharos lighthouse, Alexandria, was built B. C. 285; height 550 feet, light visible 42 miles.

Naphthalene as a Timber Preservative.

Naphthalene, which is a product of coal tar distillation, in appearance somewhat like paraffin, has been found useful in England for the preservation of timber. The wood is soaked for two to twelve hours in the melted naphthalene at a temperature of about 200 degrees Fahrenheit.

ORNAMENTAL PARQUETRY FLOORS AND BORDERS.

In addition to the many beautiful and pleasing effects readily obtained by the use of hardwood parquetry flooring, and the fact that such floors practically never wear out, their superiority from a sanitary point of view is now considered among the strongest of their recommendations, as the quantities of dust certain to accumulate in a carpet laid for any length of time, always presents the possibilities of unseen and generally unappreciated danger. In a floor of polished hardwood, such as that shown in the illustration, there is an entire absence of danger from such source, and the floor itself affords a pleasant sense of coolness which is especially comfortable during the summer months, and with the addition of a few rugs provide perfect conditions for the colder seasons. In the finished floor it is also dust, insect, and germ



A PARQUET HALL FLOOR.

proof. These floors have been manufactured in their highest perfection in Europe for centuries, and the methods there followed in their production have been adopted by the Interior Hardwood Co., of Indianapolis, Ind., who make such floors in a large variety of plain and ornamental designs f om the finest grades of foreign and domestic hardwoods. For the principal uses the choice quarter cut white oak of Indiana is used exclusively, no red oak or plain sawed oak being admitted, as the white oak of this district is superior in every respect as to closeness of grain, hardness, color, and figure or marking. Some of the most pleasing effects in parquetry are gained by reversing the grain of the woods in the patterns. In obtaining this result oak is used principally, with fine lines of color, the choicer foreign and domestic woods being utilized for the latter. It is deemed more tasteful now to introduce most of the ornamentation in the border, filling the centre with quarter sawed white oak, laid plain or in design, according to fancy.

The price of these floors heretofore had a great deal to do with keeping them from being so largely used as they would otherwise have been, but with the improvements which have been effected in their manufacture, mainly from the systematizing of a very extensive business, their cost has been greatly reduced, and a handsome polished hardwood floor can now be had complete at the price of a good body Brussels carpet. The company invites correspondence with those building new houses or improving



DESIGN REPRESENTING PROGRESS OF PARQUETRY FLOORING.

old ones, as these floors can be laid over old or new floors by any good carpenter, to make a perfectly smooth surface, and one which may be highly ornamental if so desired.

The parquetry floors will last a lifetime and improve with age, being easily kept perfectly clean with far less care than is necessary where carpets are used. In cleaning them water or soap is never applied, but a light rubbing over with a preparation of which turpentine forms the principal ingredient is all that is ever necessary.

The Willer Manufacturing Co., of Milwaukee, Wis., manufacturers of a high quality of inside blinds, window screens, screen doors, and stairwork, are making a fine exhibit at the Columbian Exposition, to which they especially ask the attention of architects, builders, and the public in general. Their space has been artistically fitted up at the north end of the gallery in the Manufacturers' Building, where they will be pleased to show to all visitors a full line of their goods.

A large and handsome colored lithograph has been issued by Samuel Cabot, of Boston, Mass., giving a spirited view of his factory for the manufacture of shingle stains, said to be the largest works of the kind in the world, and the second largest lampblack works. In one corner of the sheet is a color study, a sample of twelve sketches such as this manufacturer furnishes to those about to build, to afford suggestions in aid of the builder's own ideas.

Aluminum is found combined with 195 other minerals, and, therefore, constitutes a large part of the crust of the earth, but until recently has been very expensive because of the difficulty of separating.

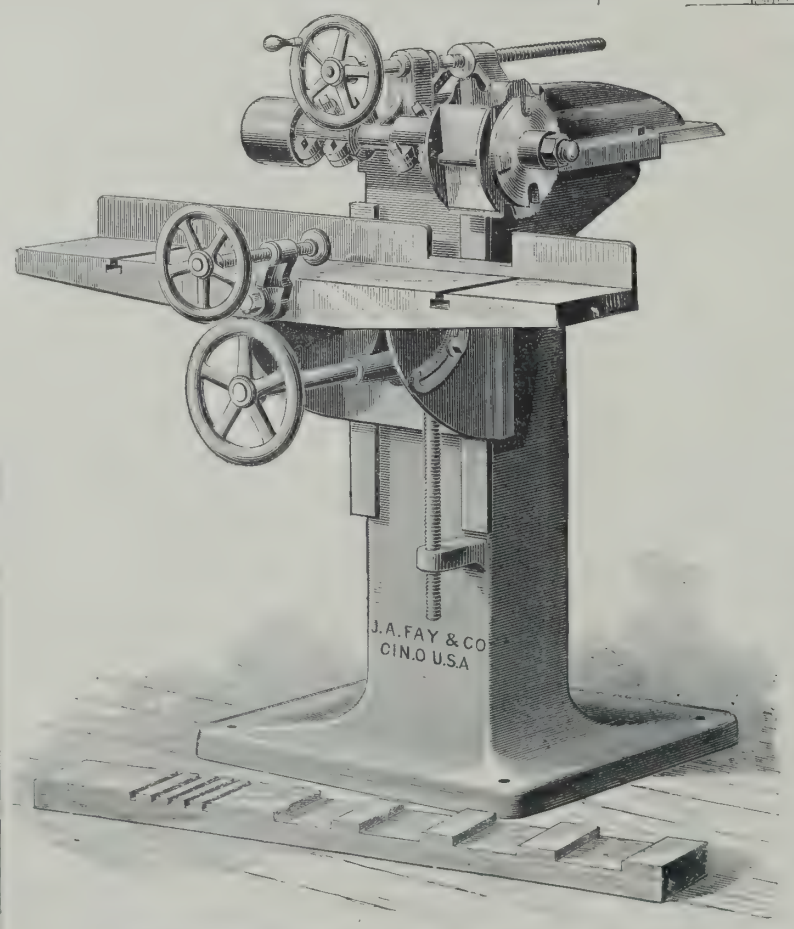
AN IMPROVED WOOD-WORKING MACHINE.

The machine shown in the illustration is designed for carpenter and agricultural work, and will cut gains of any width from half an inch to four inches, according to the size and number of cutters.

It is mounted upon a substantial column, with heavy, broad base. The arbor carrying the cutter head is of large diameter, and runs in bearings cast solidly to a head stock, which is gibbed to the top of the column, and traversed across the material by a hand wheel and screw.

The cutter head is belted from a countershaft above, placed in the centre of the line of travel between the two extreme points of the gaining head. The table or bed is gibbed to the column, and adjustable to different heights to suit the thickness of the gain to be made, and to different angles, permitting gains to be made upon either face of the piece being worked.

In operation the material is placed upon the bed, which has been previously adjusted to suit the depth of the gain

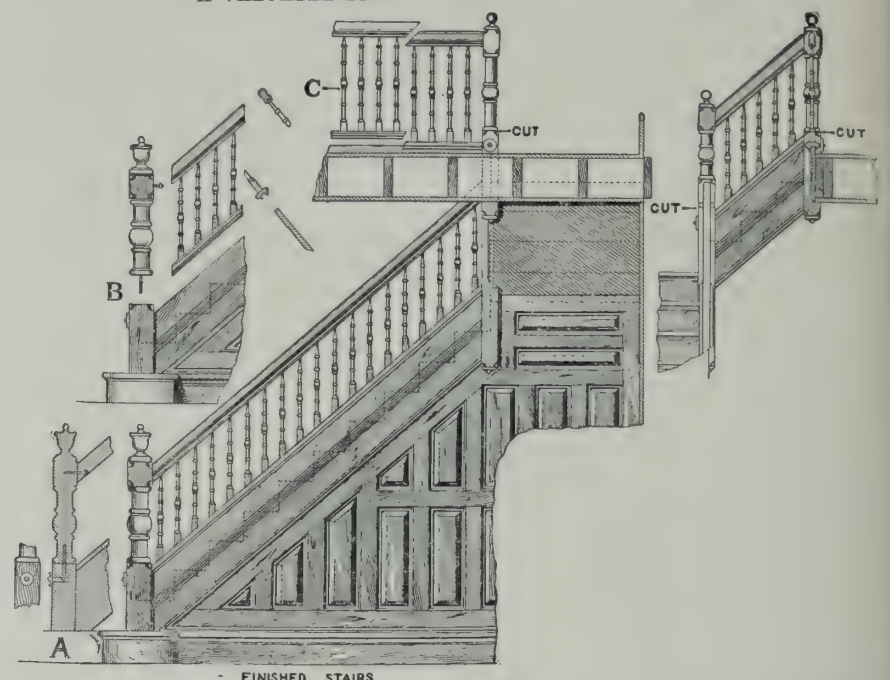


IMPROVED TRAVERSING HAND GAINING MACHINE.

to be made, when by the hand wheel the traversing frame carrying the arbor and gaining head is quickly brought forward across the material, leaving a smooth, sharp, clean cut.

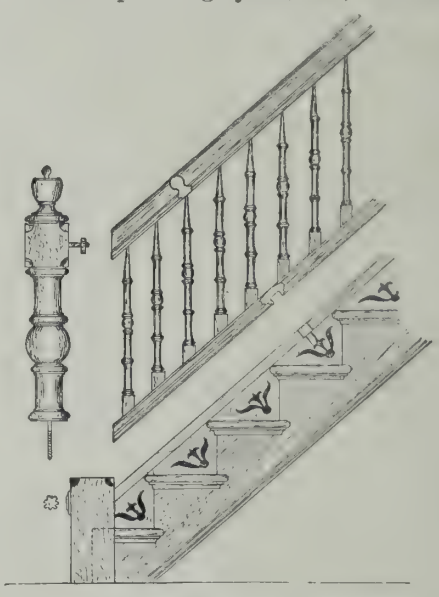
For further information address the makers, J. A. Fay & Egan Company, 209 to 229 Front Street, cor. John, Cincinnati, O.

A VALUABLE FEATURE FOR NARROW HOUSES.



FINISHED STAIRS

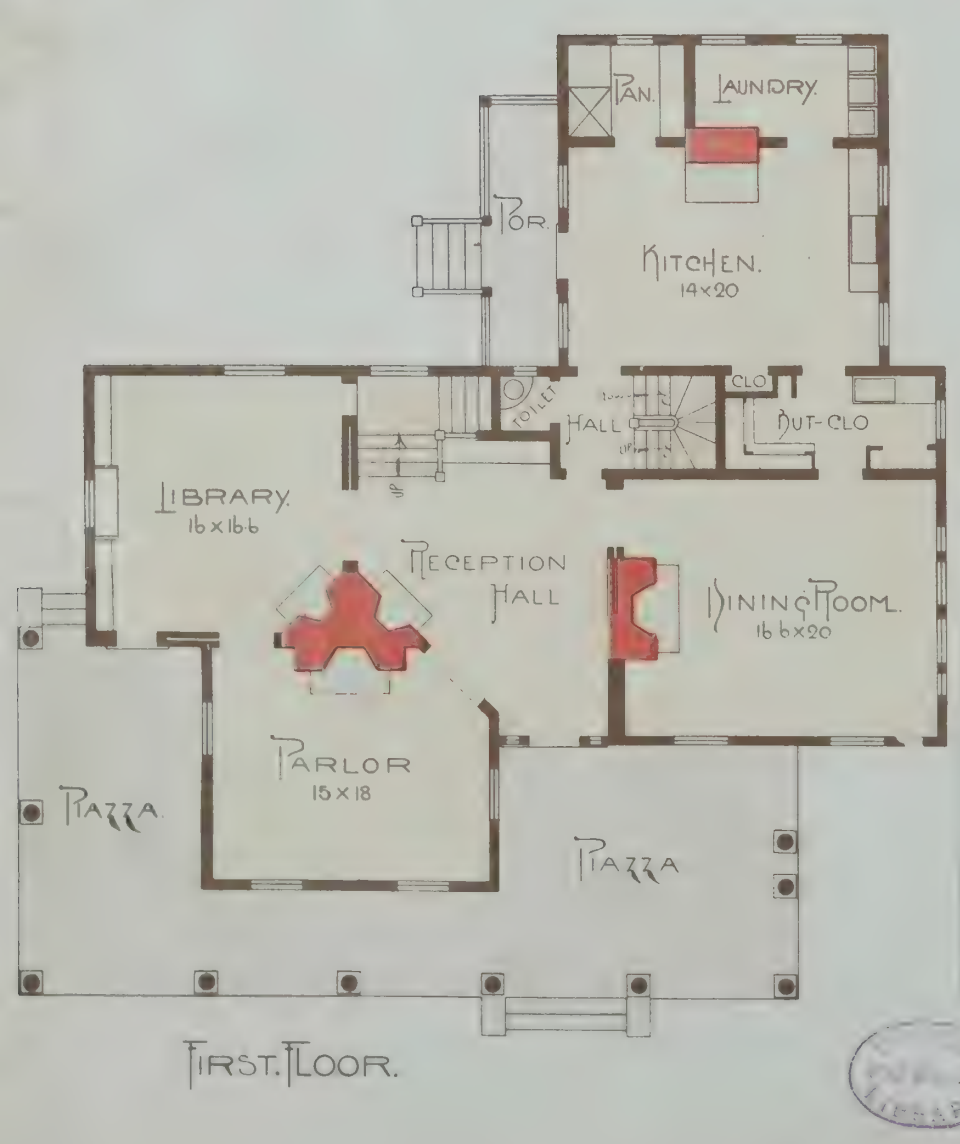
The improvements shown in the accompanying illustrations, representing a patented method of construction of removable stair rails, balusters and newel posts, is designed to be of the greatest advantage in all narrow houses, such as are generally built in cities, where the cost of land is high. In many such houses every method which ingenuity can suggest is availed of to diminish the space absolutely required in the entrances, halls, and staircases, that the rooms may thereby be made larger. In all such cases the construction shown in the illustration cannot fail to prove highly desirable, facilitating as it



does the moving of furniture, pianos, etc., up and down stairs and around turns of landings, and reducing to a minimum the disadvantages of necessarily limited room. With the improvement, the rails, balusters and newel posts may be quickly removed and readily replaced when desired. At A and B are shown two slightly different means of connecting the newel post with its base and with the stair rail, the connection being made by both projecting into sockets, where they can be reached for tightening the parts in place or loosening them for removal. At C is shown a removable section of level rails, which is fastened to newel post, same as shown at A or B. All parts are fastened with single nut rail screw; all hand rails mortised to allow the rails to be lifted off or set in on screws in newels. A narrow strip is fastened on the floor, which is not removable, bottom rail being plowed to flange-string or narrow strip on floor. The newel posts are removable at the several places marked "Cut" in the picture. These improved stairs cost but little more, and look the same when finished as those of the usual construction. Further information relative to the improvement will be given by the builders and patentees, Messrs. Cowell & Varley, 25 and 27 Duryee Street, Newark, N. J.

The Cordesman Machine Co., of Cincinnati, Ohio, are sending out a very neat circular of their celebrated No. 4 Band Resaw. It calls attention to ten decided points of advantage claimed over other resawing machines, and also gives a long list of reports received from the most prominent users.

A COLONIAL RESIDENCE AT MONTCLAIR, N.J.



FIRST FLOOR.



SECOND FLOOR.

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A VILLA AT PRIMROSE PARK, N.Y.



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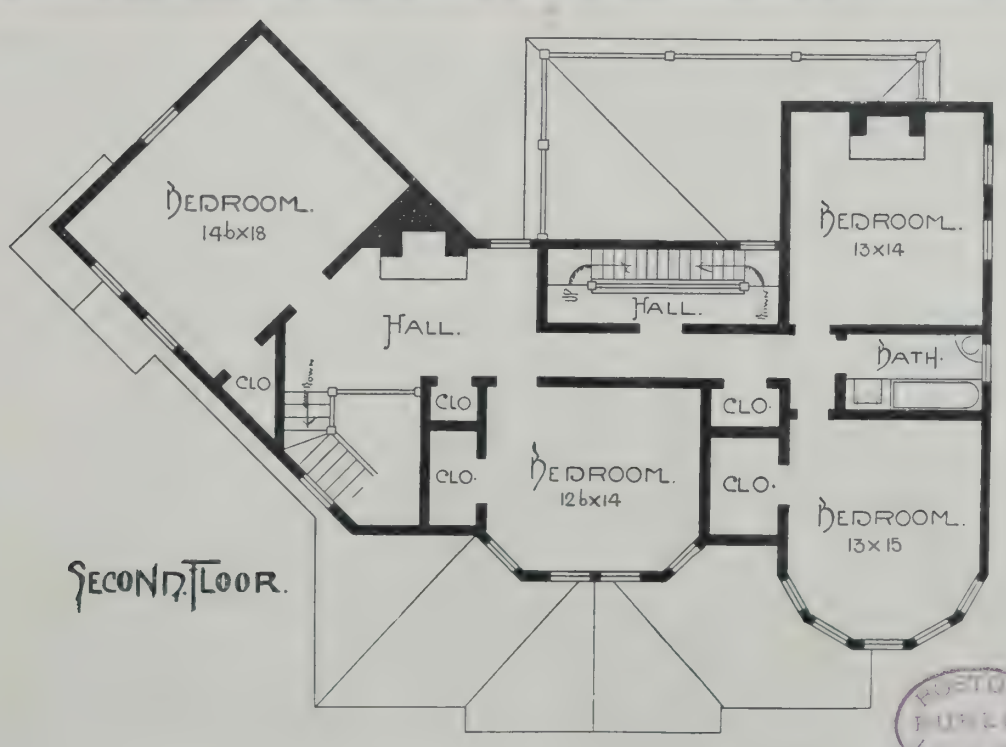
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A VILLA AT PRIMROSE PARK, N. Y.

One of our colored plates published herewith presents a villa erected for J. Armoy Knox, Esq., at Primrose Park, Mount Vernon, N. Y. An additional view is given on page 15. The design is excellent, the lines being well broken by many bay windows, and it has a broad piazza porch, and a tower, with outlook on third floor. The underpinning and stonework where shown is built of rock-faced field stone laid up at random. The building above, of wood, is clapboarded and painted terra-cotta, with bottle-green trimmings. The shingles are stained and finished a tile red. Roof covered with octagonal cut slates. Dimensions: Front, 39 ft. 6 in; side, 59 ft., exclusive of piazza and porch. Height of ceilings: Cellar, 7 ft. 6 in.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. Vestibule has a paneled wainscoting and ceiling. Hall is trimmed with antique oak. It has a paneled wainscoting, and contains an ornamental staircase, with carved newel, posts, etc. This staircase and hall are lighted by stained windows. The fireplace is built of Tiffany brick. It has facings of similar brick, with wrought iron trimmings and a hardwood mantel. Drawing-room and library are trimmed with cherry, and are provided with hardwood cornices and centrepieces, the former having a mantel with tiled facings. Dining-room is trimmed with ash, and it has a paneled wainscoting. The floors in these apartments are laid with oak and cherry. Rear hall and stairway are private from cellar to third floor. This hall and kitchen are trimmed with yellow pine, finished natural. Kitchen and pantries are furnished replete. Servants' hall is ceiled throughout with narrow-beaded yellow pine. Second floor is trimmed with ash, and it contains four large bedrooms, with closets and bath, the latter wainscoted and fitted up replete. Third floor contains four bedrooms and storage. Cemented cellar contains furnace, laundry, and other necessary apartments. Cost $14,928 complete. Mr. Walter F. Stickles, architect, Mount Vernon, N. Y.

Our engravings were made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A COLONIAL RESIDENCE AT MONTCLAIR, N. J.

We publish as a subject of one of our colored plates in this issue a very handsome residence, erected for L. Allyn Wight, Esq., at Montclair, N. J. The design is a true example of American Colonial architecture, and it is built in a thorough, substantial and workmanlike manner. The principal feature of this building is the exterior lines, which are uniform, thus giving large square rooms in the interior. The spacious piazza, ornamental balcony, frieze, and dormer windows are also good features. The underpinning is built of local brick, and the building above, of wood, is covered with cypress shingles, left to weather finish, while the trimmings are painted white. Blinds are painted bottle green. Roof covered with cypress shingles. Dimensions: Front, 54 ft. 2 in.; side, 54 ft. 4 in. Height of ceilings: Cellar, 8 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third 8 ft. 6 in. Hall and all apartments are trimmed with quartered oak. This hall has a paneled divan, hardwood cornice, and a fireplace with hearths and facings of Tiffany brick, and a carved mantel with mirror. The grand staircase has a spindle newel and balusters, the former having a cut-glass ball on top. It is lighted effectively by a large window glazed with delicate tinted glass. The entrance is through a "Dutch" door with beaded windows on either side. Parlor is separated from hall by an archway provided with a spindle transom. Both parlor and library have open fireplaces, furnished same as one in hall. Library is provided with bookcases and window seat. Dining-room, spacious, contains a fireplace and a cluster of beaded windows. The plans are laid with oak in narrow widths. Butler's pantry, kitchen and laundry are trimmed and wainscoted with ash, and they are fitted up in the best possible manner. The servants' hall and stairway are private from cellar to third floor. Toilet is conveniently located. The second floor is trimmed with white pine, finished natural. This floor contains a spacious hall, three large bedrooms, billiard room, dressing room and two bathrooms. Bath rooms are wainscoted and furnished replete. Third floor contains three bedrooms and ample storage. Cemented cellar contains furnace and all necessary apartments. Cost $15,400 complete. Messrs. McKim, Mead & White, architects, New York.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A COTTAGE OF MODERATE COST.

The engraving presented in this issue, page 18, illustrates a cottage erected for J. H. Davis, Esq., at Portland, Me. The building is constructed in a thorough workmanlike manner. The underpinning and first story are built of various kinds of rough stone, laid up at random, with brick trimmings. The second and third stories are covered with shingles and painted a dull red. Roof shingled and painted similar. Cemented cellar, under whole of building, contains laundry, furnace, and other necessary apartments. The interior throughout is trimmed with whitewood, the first floor being finished in cherry. Lobby and hall have paneled wainscotings and ceiling beams. Hall also contains a paneled divan and a staircase of unique design, which is lighted by delicate stained glass windows. Parlor has a bay window and fireplace trimmed with tiles and provided with a cherry mantel. Dining-room has a wainscot in panels, and a pleasant nook with seats and fireplace built of brick, with hearth of same. Kitchen and pantries are fitted up in the best possible manner. The trim on the second floor is treated in the natural color. This floor contains four bedrooms and bathroom, the latter wainscoted and furnished complete. The third floor contains two bedrooms, tank and trunk rooms. Dimensions: Front, 31 ft.; side, 44 ft. 6 in. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in; second, 9 ft.; third, 8 ft. 6 in. Cost, $3,400 complete. Mr. John Calvin Stevens, architect, same place.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A COTTAGE AT WAYNE, PA.

We publish on page 19 a photographic engraving and floor plans of a cottage, Queen Anne in treatment, which has been erected for Mr. Wendell, at Wayne, Pa. The design is provided with a well-broken exterior and a convenient interior arrangement. The underpinning and balustrade to piazza are built of local granite, laid up at random. The first story front and one side is built of brick. The remainder of the exterior is covered with shingles and stained a dark brown. Roof is slated. Dimensions: Front, 33 ft.; side, 57 ft. 6 in., exclusive of front piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8. Hall is trimmed with antique oak. It has a lobby with a tiled floor, and an ornamental staircase with carved newels. This staircase is lighted by stained-glass windows with excellent effect. Drawing and music rooms are treated in ivory white, the latter having a fireplace with tiled trimmings and a unique mantel with columns and mirrors. Dining-room is trimmed with oak. It has a paneled wainscoting, china closet, and an open fireplace built of pressed brick, with hearth laid of same. Butler's pantry is furnished up complete. Kitchen and laundry are wainscoted and provided with the usual fixtures. The second floor is trimmed with whitewood and finished natural. This floor contains four large bedrooms, closets and bathroom, while the third floor has three bedrooms and trunk room. Bathroom is wainscoted. Cemented cellar contains furnace, laundry, and other necessary apartments. Cost $6,000 complete. Messrs. F. L. and W. L. Price, architects, 731 Walnut Street, Philadelphia, Pa.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A HOUSE FOR $2,500.

The engraving on page 20 presents a dwelling of low cost, recently erected for A. B. Root, Esq., on Armory Hill, at Springfield, Mass., and from plans prepared by the proprietor. The building is designed with the aim of securing the most attractive elevations, the best plan and the lowest cost. The underpinning is built of brick, and the exterior above, of wood, is clapboarded and painted dark brown with white trimmings. The gables are shingled and painted similar. Roof slated. Dimensions: Front, 32 ft.; side, 35 ft. 6 in., exclusive of piazza and porch. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. Hall is trimmed with ash, and it contains an ornamental staircase, turned out of similar wood, and is lighted by a stained glass window. Parlor is finished in cherry, and is provided with an open fireplace, furnished with tiles and a hardwood mantel. Dining-room is finished in oak, and contains a large china closet, with drawers, dressers and shelves. Kitchen is wainscoted, and provided with the usual fixtures complete. Rear stairs are to main landing of front stairway. Second floor is finished in cherry, and it has a large, open hall, three bedrooms, four closets and bathroom. Washroom is wainscoted and fitted up replete. Third floor contains two bedrooms and ample storage. Cost $2,500 complete.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

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GRACE CHURCH, PLAINFIELD, N. J.

We publish on page 21 an engraving and ground plan of Grace Episcopal Church, at Plainfield, N. J., which has been erected through the endeavors and perseverance of its rector, Dr. Rodman. The building is located on the corner of Seventh and Sycamore Streets, and is built in a thorough, substantial and workmanlike manner. The exterior walls are built of natural local stone from Second Mountain, laid in random, rustic rubble, and is of a soft gray color, tinged with red. The church is set with a gable toward the street, a long porch or narthex running along the front. At the northeast corner is the square tower, forming a porch with belfry above, and the top is finished with battlemented parapets and a flat pyramidical roof. The aisles are rather low, with long overhanging roofs, and the windows are small. There are large dormer windows in the clerestory. The transepts are pierced by large memorial windows of stained glass, and a deep chancel and large organ chamber for full choral service complete the vista of the nave. The plan is in the form of a Latin cross, of which the transepts are the arms and the nave and chancel the stem. The nave has a seating capacity of 601 seats: the transepts, 108; and the choir and clergy, 36; making a total of 745 seats. The peculiarity of the plan adopted insures every person a full, uninterrupted view, allowing the pillars themselves to be made of their old-fashioned size and solidity. The choir and clergy vestries are in the northeast corner, with necessary lavatories below; the latter is provided with an open fireplace. The interior woodwork and furniture are of old English oak. The altar and reredos, rising to a height of 13 ft., is made of English grained oak and is carved in an elegant manner. Besides the large carved font, and font cover, silver service, vases and oak credence, we may briefly mention the oak and brass pulpit, which is of a very handsome design. The interior walls are plastered and then tinted. The roof is of dark, open timberwork. Cemented cellar, under whole of building, contains furnace and all other necessary apartments. Cost of building $32,000. Furnishings, lights, heating, pews, chancel furniture, etc., cost $8,000, making a total of $40,000 complete. Mr. R. W. Gibson, 18 Wall Street, New York City, was the architect.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

IN our number for April last, on pages 52 and 53, by the printer's error, a transposition of the floor plans of the two buildings there represented was made, which probably most of our readers noticed at the first glance. The floor plans for Architect Mersereau's house are shown on page 53, and the floor plans of Architect Price's house are shown on page 52. We take pleasure in making this correction If readers should at any time notice a mistake, the editor will feel greatly obliged for a postal card calling attention thereto.

A DWELLING AT BROOKLINE HILLS, MASS.

We illustrate on page 24 a dwelling recently completed for L. Shannon Davis, Esq., at Brookline Hills, Mass. The design is a mixture of Queen Anne and Colonial architecture. The underpinning is built of local granite, and the exterior above is covered with shingles and stained moss green with white trimmings. The roof is shingled and stained similar with good effect. Dimensions: Front, 33 ft.; side, 46 ft., exclusive of front and rear piazzas. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. Entrance is through a lobby with a hardwood floor. Lobby is provided with Dutch doors, the upper half being hung and swung separate from the lower half. The hall is trimmed with oak. The staircase is of unique design. It is turned out of oak and is provided with a carved newel. The fireplace is built of Tiffany brick, with hearth and facings of same, and is provided with a hardwood mantel. Parlor, trimmed with whitewood, is treated in ivory white. It contains a fireplace with tile trimmings, and a Colonial mantel with mirror and spindle columns. Library and dining-room are trimmed with oak, the former having a fireplace complete. The floors are of hardwood. Butler's closet is furnished replete. Kitchen is wainscoted and trimmed with whitewood and is fitted up in a first class manner. There are four bedrooms, large closets and bathroom on second floor. This floor is trimmed with whitewood, finished natural. Bathroom is wainscoted and provided with the usual fixtures. Two bedrooms and trunk room on third floor. Cemented cellar contains furnace, laundry and other apartments. Cost $5,120 complete. Messrs. Shepley, Rutan & Coolidge, architects, Ames Building, Boston, Mass.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A COTTAGE AT ELM STATION, PA.

The engraving on page 22 presents an English cottage erected for C. W. Macfarlane, Esq., at Elm Station, Pa., and from plans prepared by the proprietor. This is a very quaint design. The stone balustrade is a very effective feature. The underpinning and first story are built of local granite, rock-faced and laid up at random. The second story is paneled, with the space filled in with shingles. This shinglework is painted Colonial yellow, with bottle-green trimmings. Roof is slated. Dimensions: Front, 27 ft. 6 in.; side, 51 ft., not including front piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. The interior is arranged in a most complete manner, and is trimmed with white pine. Hall is finished natural, and is provided with an ornamental staircase, turned out of ash. Parlor and library are treated in ivory white, and they have fireplaces furnished with tiled trimmings and Colonial mantels, with columns and mirrors. Dining-room is well lighted, and provided with porch and butler's pantry. Kitchen, laundry, and pantries are wainscoted and provided with the usual fixtures. There are five bedrooms and bathroom on second floor, and two bedrooms and trunk room on third floor. Bathroom is wainscoted and fitted up complete. Cemented cellar contains furnace, laundry, and other necessary apartments. Cost $3,900 complete.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A DWELLING AT NARBERTH, PA.

We publish a wood and stone dwelling on page 23, which has been erected for Messrs. Lowry & Goodman, at Narberth, Pa., and from plans prepared by the proprietors. The design has a pleasant piazza, balcony, bay window, and lookout. The first story and balustrade to piazza is built of rock-faced Chestnut Hill granite. Second story is covered with shingles, and painted light olive green, with darker trimmings. Roof shingled and painted red. Dimensions: Front, 29 ft. 6 in.; side, 41 ft., not including front piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The interior is trimmed with white pine. The doors and windows have heavy moulded casings. Hall contains an ornamental staircase turned out of oak. It has a carved newel and a window seat at first landing. Parlor, library, and dining-room are finished natural. The apartments are separated by double sliding doors. Library has an open fireplace furnished with tiles, and oak mantel with mirror. Dining-room has a bay window with a paneled divan. Butler's pantry is fitted up with drawers, shelves, and cupboards. Kitchen and laundry are wainscoted, and are furnished replete. There are five bedrooms and bathroom on second floor, and two bedrooms and trunk room on third floor. Bathroom is wainscoted. Cemented cellar contains furnace and other necessary apartments. Estimated cost, $5,000 complete.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.



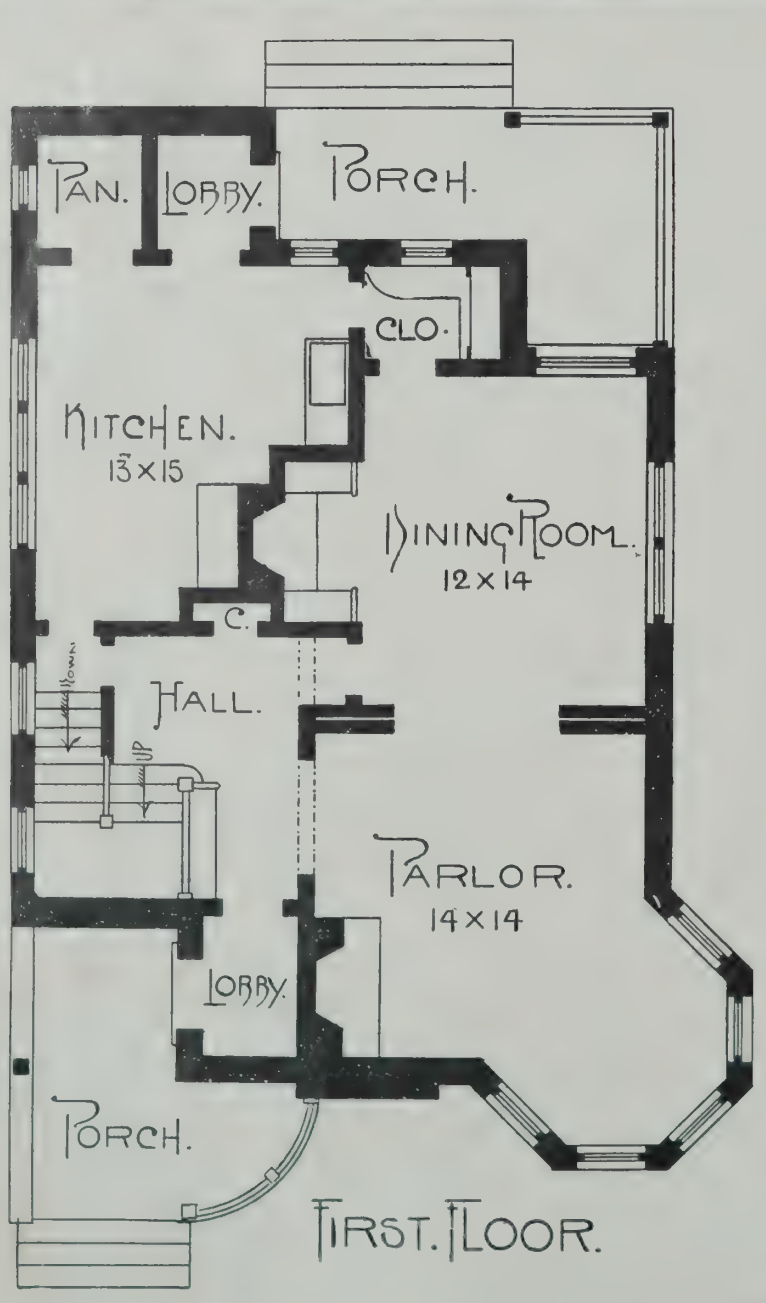
A VILLAGE LIBRARY.

A VILLAGE LIBRARY.

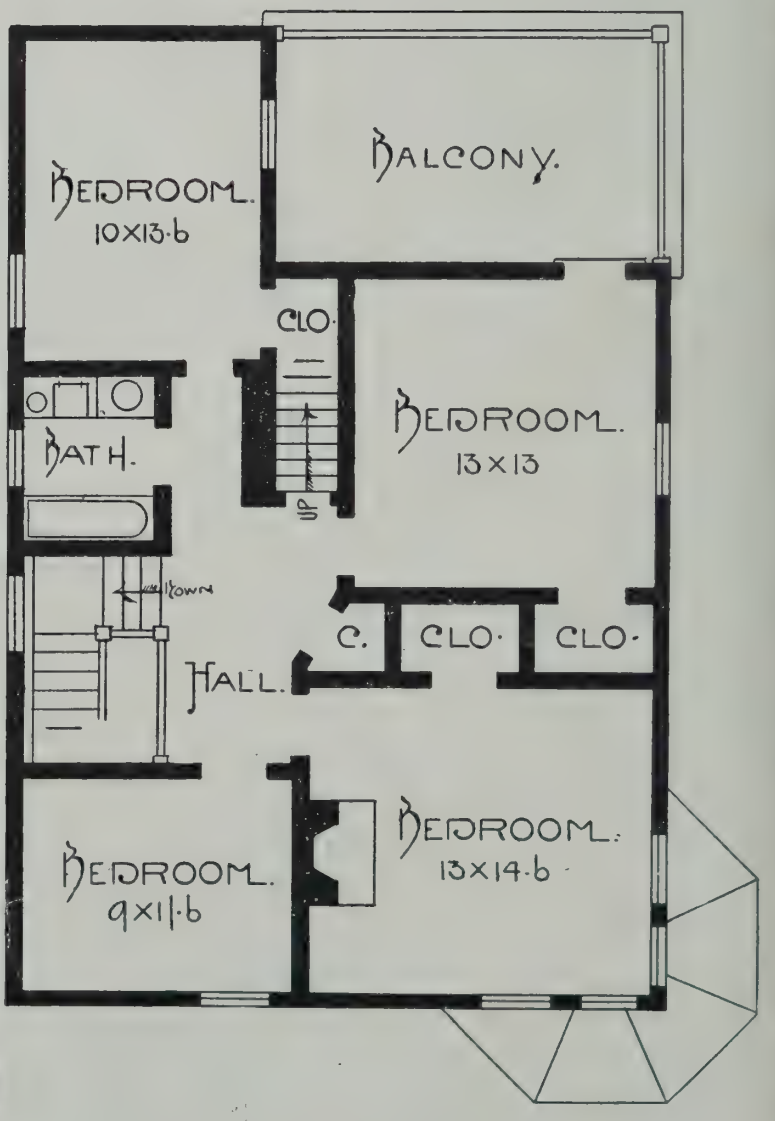
There are many country places in which we believe an inexpensive library building would be a great boon to residents, and might also be made a satisfactory investment. There should be accommodations for the librarian and family. We give above a tasteful design for such a structure, by E. B. Lamb, architect, for which we are indebted to the *British Architect*.

SPRUCE (or Washington pine, as it is sometimes called) will in the near future become one of our most valuable woods. Spruce is especially valuable to the manufacturers of tubs and pails, because it does not communicate taste or odor to the contents. This fact is especially pleasing to butter makers, as butter easily absorbs flavor and odor of utensils.—*Southern Lumberman.*





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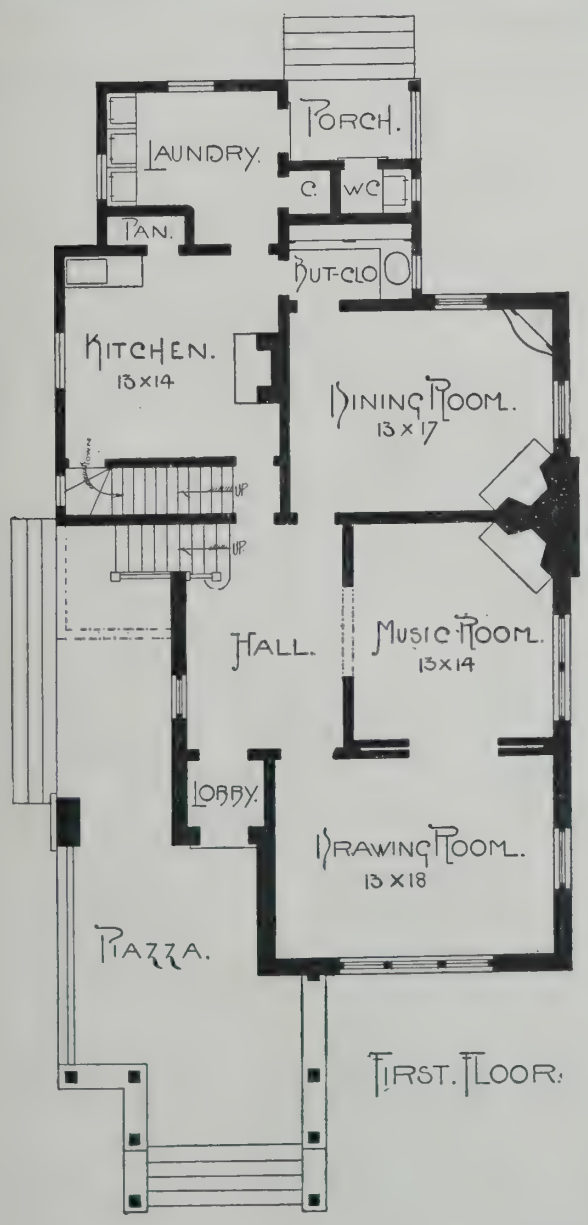


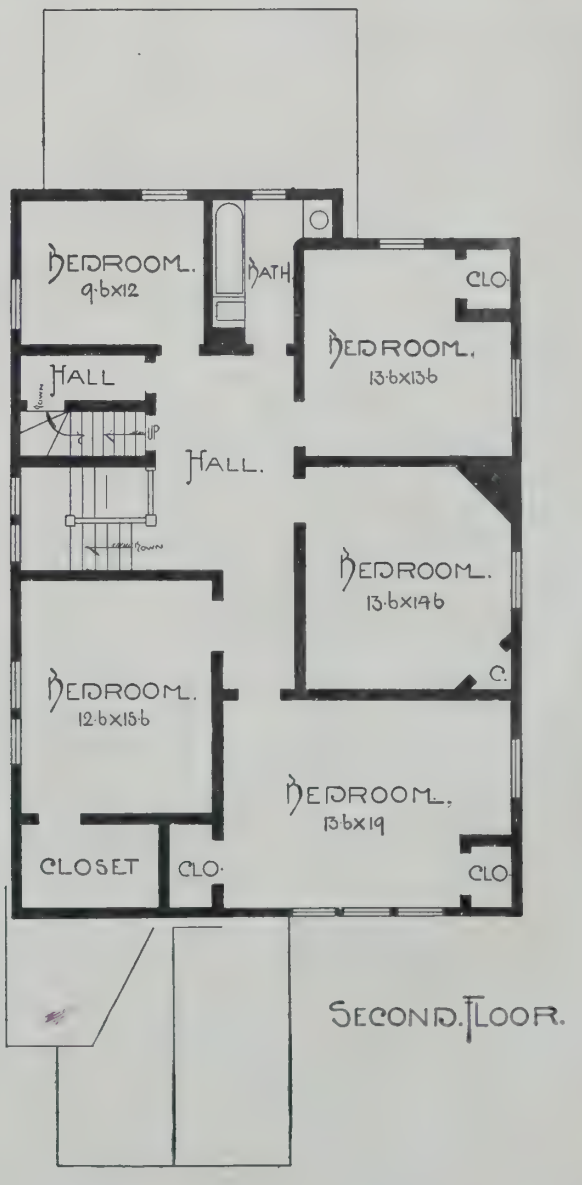
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A COTTAGE OF MODERATE COST.—See page 16.



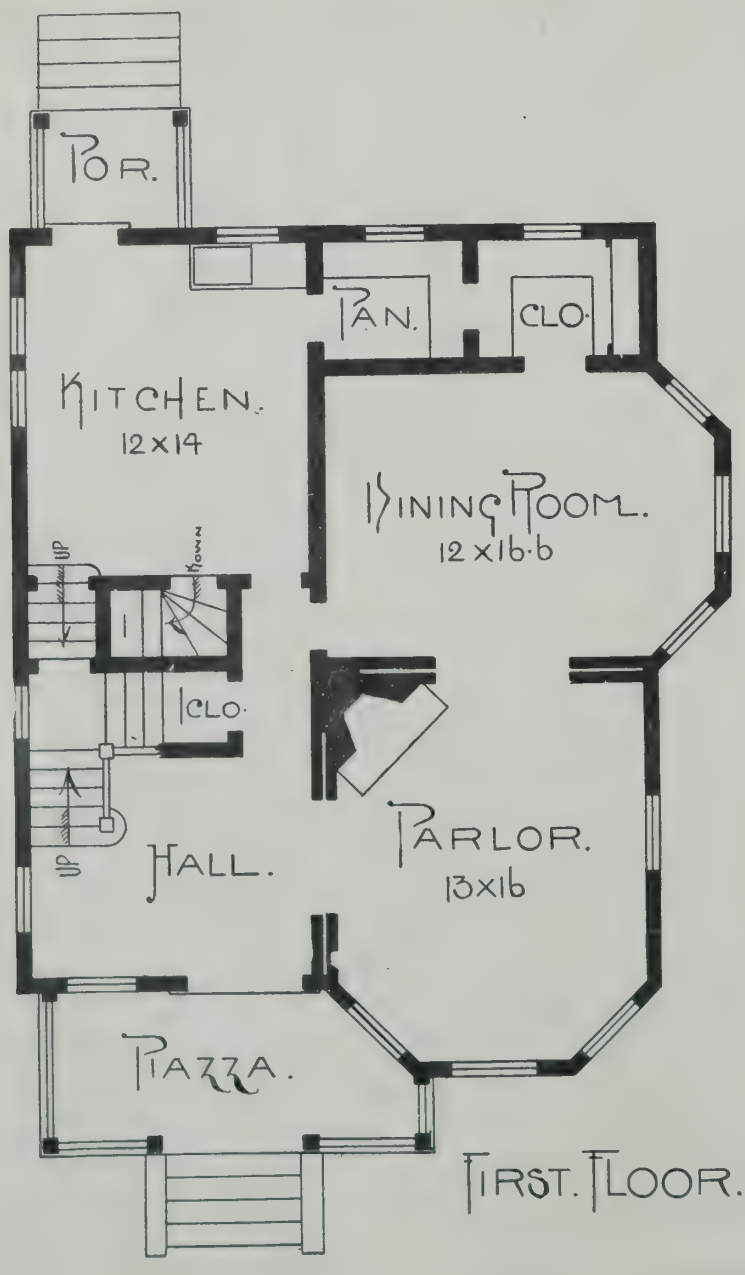




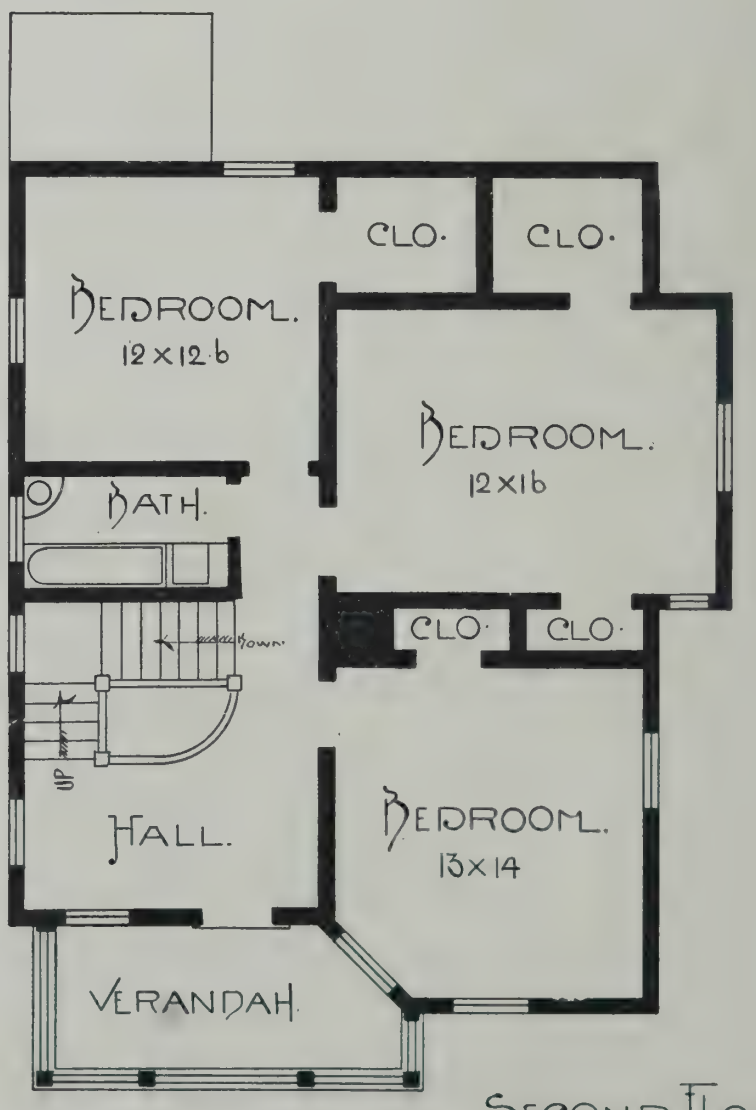
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A COTTAGE AT WAYNE, PA.—See page 16.



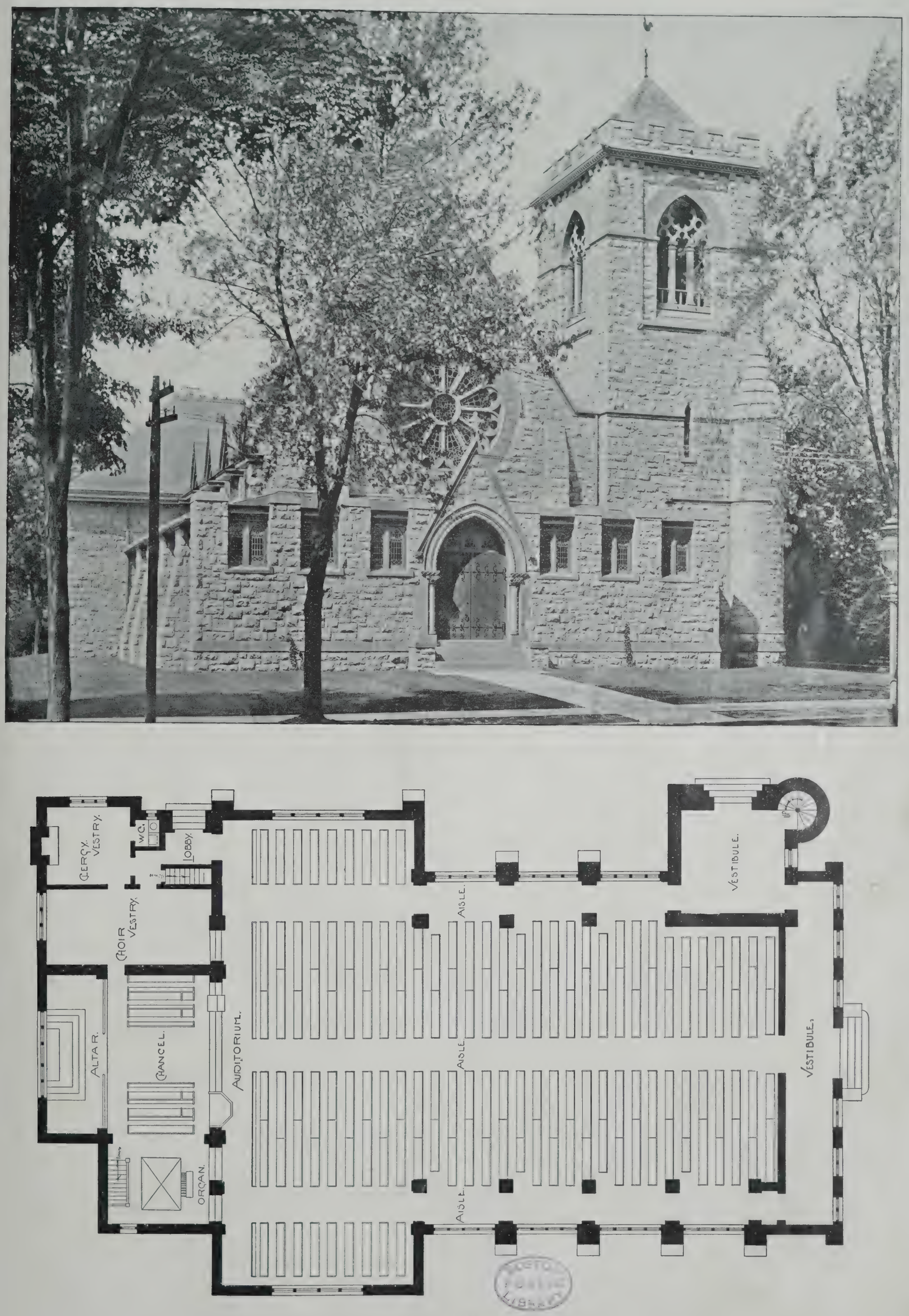


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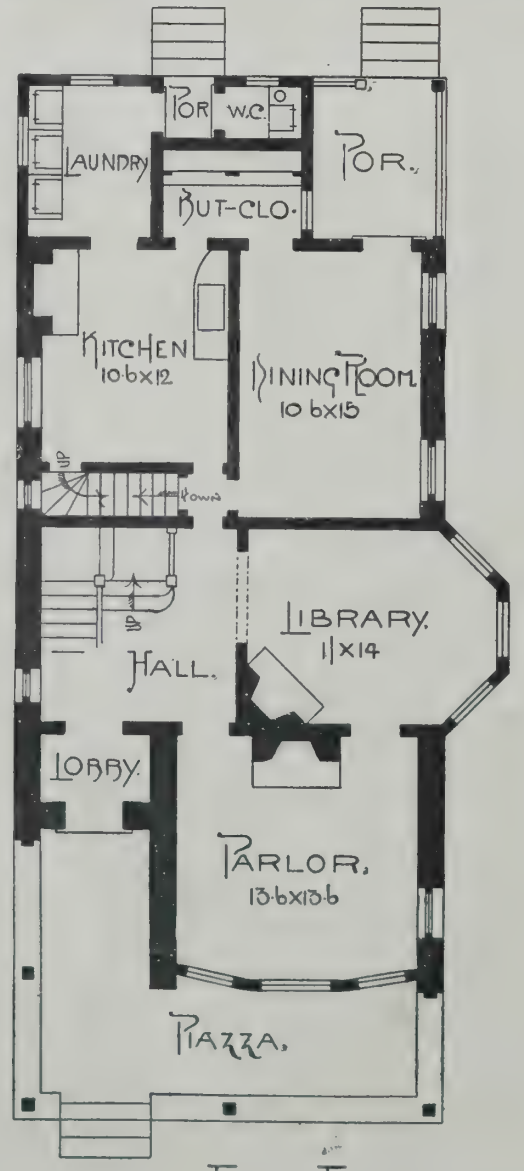
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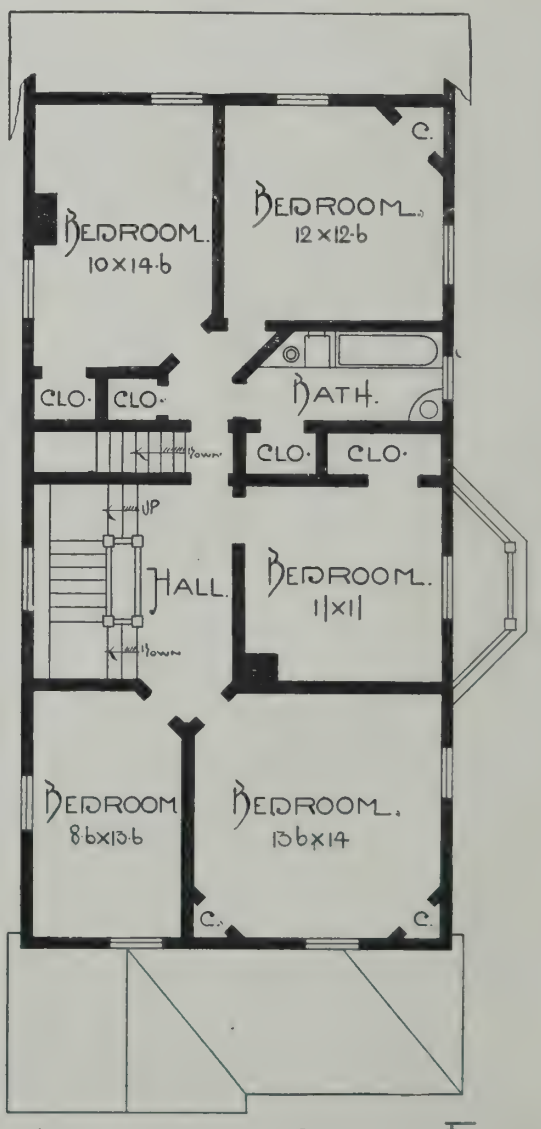
GRACE EPISCOPAL CHURCH, PLAINFIELD, N. J.—See page 17.

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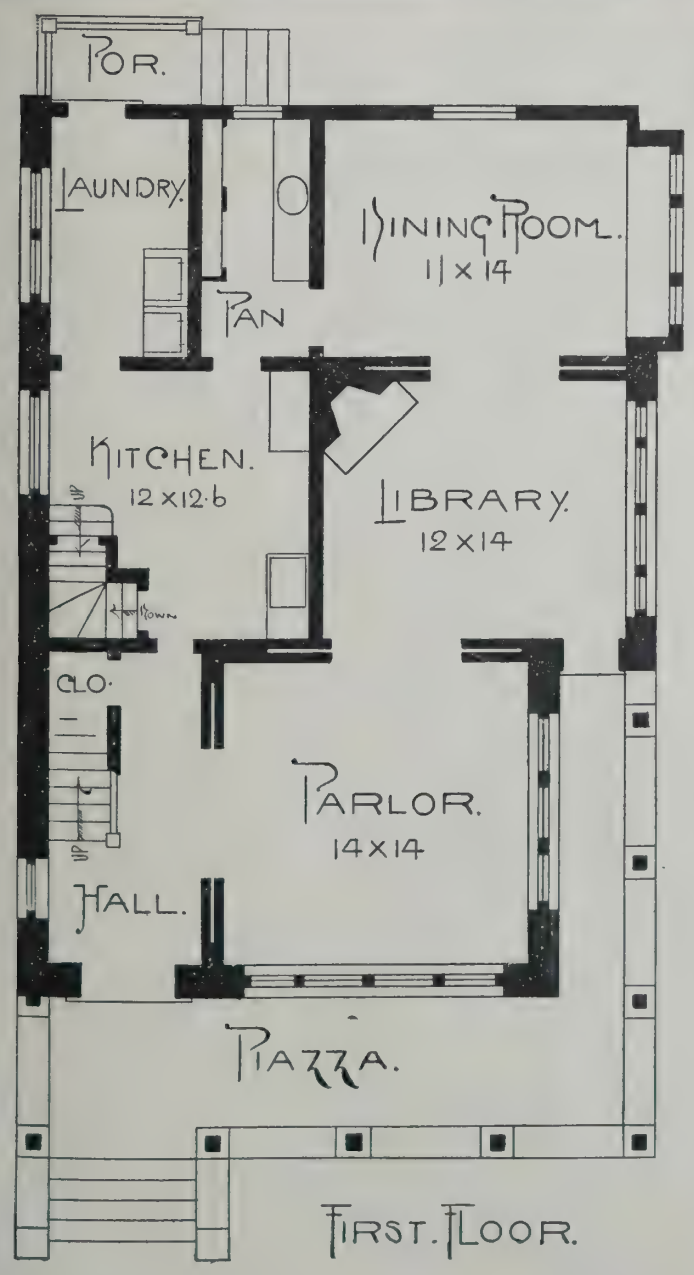


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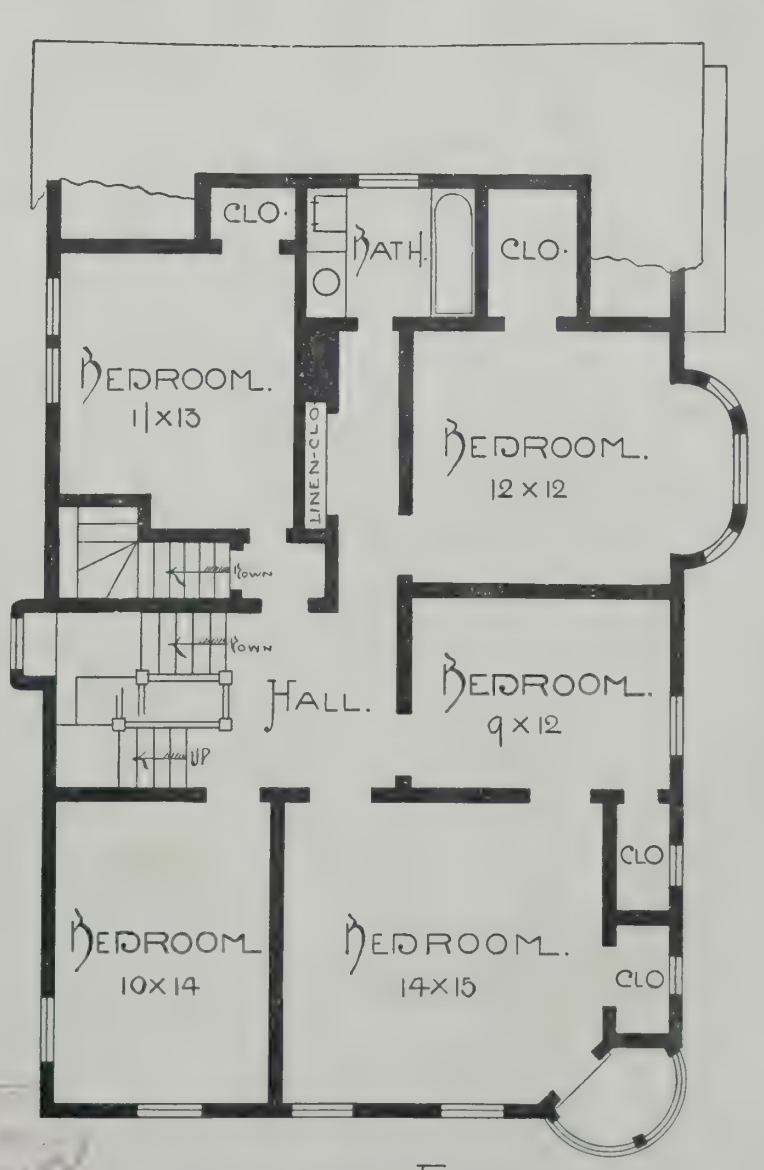
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A COTTAGE AT ELM STATION, PA.—See page 17.





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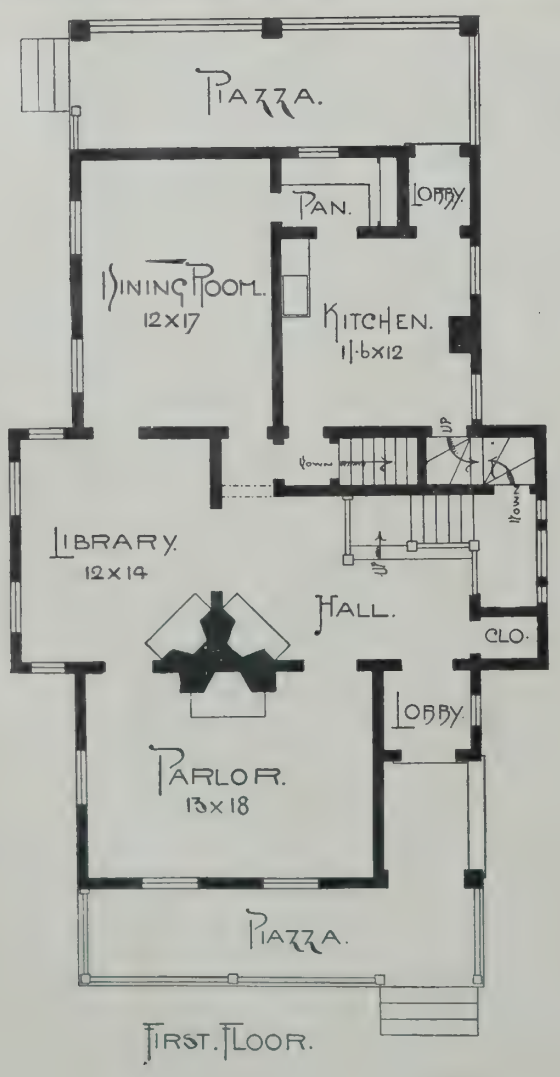


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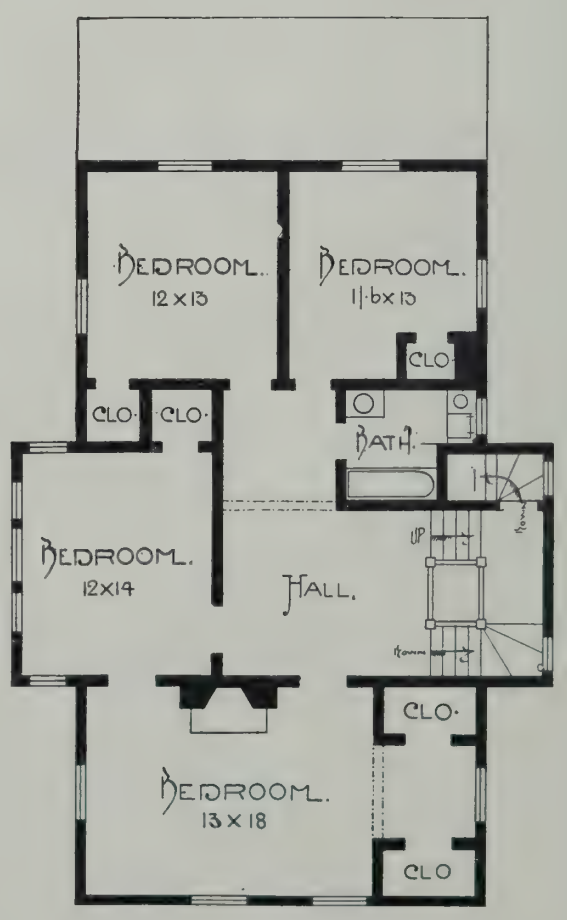
A DWELLING AT NARBERTH, PA.—See page 17.







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A DWELLING AT BROOKLINE HILLS, MASS.—See page 17.

THE WORLD'S COLUMBIAN EXPOSITION.

Continued from July Number.

The Palace of Fisheries consists of a large central building with polygonal pavilions of true originality in the Spanish Roman style. The roof, as well as a portion of the wall, is covered with gilded tiling.

The Palace of Agriculture is 800 feet in length by 500 feet in width. At the façade fronting upon the lake rise the heroic columns, symbolizing the thirteen original States of the Union. The building has but one story, and this gives not only picturesqueness, but also great boldness to the architecture. The cornice line is about 60 feet above the stairway. On each side of the main entrances there are Corinthian pillars, 50 feet in height and 5 feet in diameter. The area of the central pavilion is 460 square feet. A vestibule, 70 feet in length, leads to a rotunda surmounted by a glass dome of 130 feet elevation, and in which are remarked numerous statues emblematical of agriculture. A monumental staircase gives access to a meeting hall, easily capable of seating 15,000 persons.

The Palace of Horticulture is over 300 feet in length and over 250 feet in width. Its central pavilion is like an immense bell glass. It is flanked by two monumental pavilions, which are of an elegant and very free Florentine style.

The Palace of Fine Arts, which stands at the northern part of the park, is likewise architecturally charming. Constructed in the Ionian style, Mr. Atwood, the architect, has been able to give it the stamp of rare contemporaneous originality. It is about 600 by 300 feet, and consists of a large nave and a transept that intersect each other at the centre, where there is a dome, 115 feet in diameter by 138 feet in height.

The Palace of Mines is constructed in the French style. One of its façades fronts the south, and the other the north, upon the lake.

The Palace of Electricity is 750 feet in length by 375 feet in width. It is formed of Corinthian pillars, 45 feet in height and 3¾ feet in diameter. The entablature that they support is light and of charming harmony. At the four corners of the building stand pavilions of the nature of the acropolises of Greece, dominated by a tower, 138 feet in height. Opposite the main entrance stands a colossal statue of Benjamin Franklin, while over the secondary doors are read the names of the principal propagators of electricity.

The Government Palace, constructed of materials from the State of Washington, covers a space of ground of 155 feet by 240 feet.

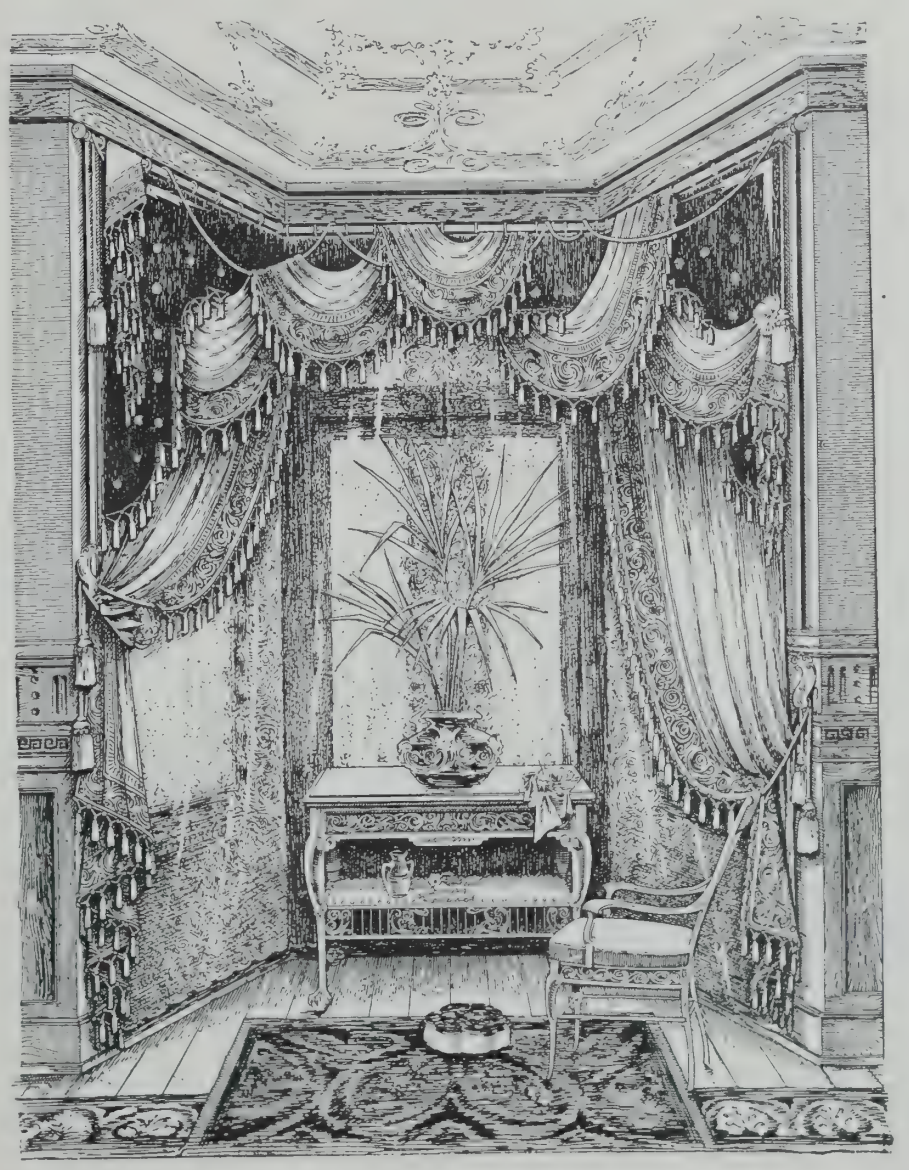
The Transportation Palace stands at the southwest extremity of Jackson Park, between the Mines and Agricultural buildings. A huge arch designates the entrance of it. Its façade is simple and of wide proportions. Secondary entrances, preceded by terraces and statues, give its profile the aspect of an ultra-modern temple. The palace measures 960 feet by 250 feet. In this exhibition will be found a complete history of human locomotion.

The Administration Palace covers but a small space, but its exterior is of such a decorative elegance that it may be considered as one of the most remarkable masterpieces of modern construction inspired by the French Renaissance.

The Machinery Palace, constructed after plans by Messrs. Peabody & Stearns, of Boston, comprises three naves ingeniously combined.

A BAY WINDOW TREATMENT

The bay window shown on the present page was, in its completed form, one of the most strikingly charming drapery compositions we have ever seen. And its beauty is but poorly indicated by the black and white sketch, which, though it utterly fails to illustrate the rich and splendid harmony of its coloring, is our only means of showing its general arrangement and manner in which the masses were distributed. The walls were covered with a gilt paper, which was stippled over with small indentations. On this surface was frescoed a pattern in blue, expressly designed upon a French sixteenth century motive, giving the walls an appearance of being covered with an elaborate and richly textured fabric. The ceiling was handsomely frescoed in delicate tints, pale gold predominating, and the frieze was worked in a light flowing pattern of gesso work. The ground, which resembled old ivory, was left untouched, but the raised parts were painted blue, and lightly lined in with gold for the veins and markings. The woodwork was wholly of natural cherry. The dado band was carved, but very slightly, and the space below was simply paneled. The floor was of hardwood, waxed, and nearly covered by a long piled carpet, soft in coloring and woven in one piece. For the floor space in the bay, not covered by the main carpet, rugs were used of similar color and texture. The curtains and the overdraperies were made of ivory-colored satin, handsomely embroidered in mingled colors, gold predominating. The valance was of pale blue satin, with gold ornaments. The cords, tassels, loops and fringes were of ivory and blue. The curtains were of handsome Renaissance lace.—*Carpet and Upholstery Review.*



BAY WINDOW DECORATIONS.



A SUGGESTION IN CORNER DECORATION.

Wiring of Buildings for Electric Lights.

It is almost universally the practice in draughting specifications for electric light wiring to stipulate that "the loss in potential in circuits shall not exceed two [2] per cent.," or that "the wiring shall have not more than two [2] per cent. drop," meaning that the loss in volts on any conductor, due to the resistance encountered by reason of the current passing through that conductor, shall not exceed two per cent. of the voltage applied. Why two per cent. loss is so generally stipulated is not plain, neither is it always necessary that it should be specified in every case, as in some instances a loss of three or four, or even five per cent. would be more advantageous to the owner of a building, than would a loss of two per cent. Nevertheless, a two per cent. "drop" is generally specified, yet it is a fact that of all the larger buildings in San Francisco, hardly one of them comes up to the two per cent. limit specified. When it is realized that 50 per cent. more copper is required to wire a building under two per cent. loss than under three per cent. loss, the importance of the matter becomes apparent. To place the facts in another light: a certain building is to be wired for incandescent lighting under specifications calling for two per cent. loss. To carry out these electric specifications would require the installation of, say, 3,000 pounds of copper wire. The electrician, however, realizing that the architect generally has no means of determining whether the specification has been adhered to in the matter of "drop," concludes to install the circuits at three per cent. loss. He does so, and what occurs? The insurance inspector examines the installation and accepts it, for he only looks at the work from the fire underwriters' standpoint, and his certificate only attests that the wiring presents no fire hazard. The central station people also examine the work, and finding it to be safe and properly laid out, they too pass the work, for they do not compare it technically with the specifications any more than the insurance inspector does. The current is thrown on to the wiring, it works satisfactorily, all lamps burn to the satisfaction of the architect, nothing more is said about the two per cent. loss stipulation, the work is accepted and paid for, and that is the end of it so far as 99 cases in 100 are concerned. Yet what has the wireman done? Instead of installing 3,000 pounds of copper wire, as called for under the two per cent. clause, and as he was paid for doing, he wired the building for three per cent. loss, and saved thereby 1,000 pounds of copper wire, for under three per cent. loss but 2,000 pounds was required, and no one was the wiser.

These frauds, so palpable to an expert electrician, yet concerning which laymen are utterly ignorant, are practiced daily by all save a very few first-class wiring companies, and indeed many concerns ignore the loss requirement altogether in wiring, yet consider it in making up bids. Others will maintain that their work is figured for two per cent. loss, say, while upon questioning it soon becomes apparent that they do not know how to figure drop in potential, or they will use a two per cent. wiring table, and will generally get a two per cent. loss each on mains, submains and ultimate circuits, or six per cent. loss in all, while two per cent. was called for. A large concern, having a capitalization of several hundred thousand dollars, when questioned as to the fulfillment of the two per cent. clause in a certain building it had wired, struck the keynote in the matter when it frankly and honorably admitted that it had not carried out the two per cent. requirement, for the reason that it could not do so and compete for business. It had, however, placed the wiring in accordance with "commercial usage," and it maintained that for that reason the work should be accepted.

The writer has frequently been asked to assign a reason why such discrepancy so frequently exists between the bids of different electrical concerns on the same piece of work. Reasons for this may be found from the facts above cited. Some few concerns will follow the specifications rigorously in every detail, while others, taking advantage of the almost universal ignorance prevailing in regard to electrical matters, contract to do work that they never intend to perform. A dual result ensues. Owners pay for something they do not get—but they do not know it—and the electrical wiring business is utterly demoralized, both physically and morally.

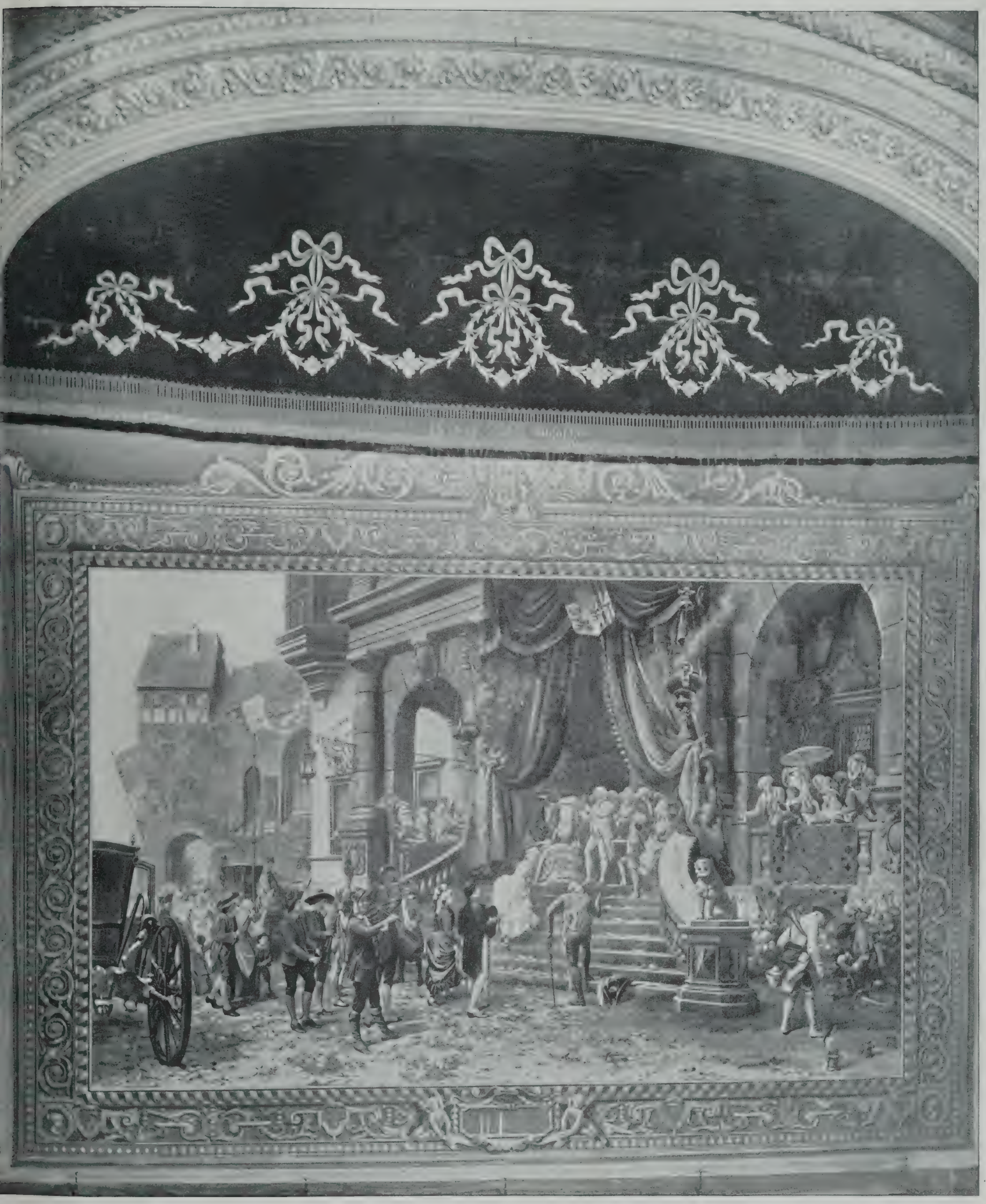
It must not be inferred that a two per cent. specification is never advisable, or that a three per cent. clause will prove equally satisfactory, as in the instance cited.

To lay down a general law even for a given class of building is impossible, and each building must receive specific consideration, both in the matter of proper loss in potential as well as in the load basis upon which to figure the circuits. It is evident, then, that the draughting of electric wiring specifications is a matter worthy of most serious consideration, and concerning which the architectural profession is deeply interested.—GEO. P. LOW, *in California Architect.*



THE NEW FIFTH AVENUE THEATRE, NEW YORK.

THE FAMILY CIRCLE.



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THE NEW FIFTH AVENUE THEATRE, NEW YORK.

THE DROP CURTAIN.—PAINTED BY H. LOGAN REID.

The Fifth Avenue Theatre,

NEW YORK CITY.

BY HENRY M. STEVENS.

We continue in this month's number the elegant series of illustrations of this splendid establishment, and present photographic plates of the Drop Curtain and of the Family Circle. As to the latter, probably we shall have more to say in our next. Our present space limits us to a few remarks upon the Drop Curtain, which is a noble work of art, and adds to the general scenery of the theatre.

The Drop Curtain.

Among the most charming decorative features of the auditorium is the drop curtain, painted by the young and talented scene painter of the theatre, H. Logan Reid, after the original by Cottazzo, "*The Crowning of the Bride*"—a souvenir of the happy days of Louis XVI. The scene itself is one of considerable animation and introduces a large number of figures. The atmosphere of old French court life, and the simplicity of the country custom of the time, in which a provincial bride and groom seek distinction at the hands of Louis and his beautiful consort, Marie Antoinette, through the graceful ceremony of this coronation, are most attractively and truthfully portrayed. Mr. Reid has sustained the excellent reputation he has secured elsewhere by his work in the present example, which supplements with no mean achievement the curtains painted by him in the Empire Theatre, Philadelphia; the Columbia, Globe and Bowdoin Square theatres of Boston, as well as the Grand Opera House, the Grand Museum and Howard Atheneum of that city. The Academy of Music, at Reading, Pennsylvania, and the People's Theatre, of this city, are also in possession of effective work from his brush. He has a large and well equipped permanent studio in the Fifth Avenue Theatre Building, which forms an annex, in fact, to that building, with entrances on both Twenty-eighth and Twenty-ninth Streets.

The Fireproof Scenery.

The entire scenery of the theatre has been treated with the "Martin Process" of fireproofing, the discovery of the celebrated French chemist, Prof. Abel Jean Martin, of Paris, France, and secured by letters patent in the United States to the Martin Process Fireproofing Paint Company, of this city and of St. Paul, Minnesota. The process has been thoroughly examined, reported upon, and indorsed by eminent chemical authorities both in this country and Europe. Professors E. Dumas, Paliard and Troost, members of the Academy of Science, France, were a committee appointed at the demand of the Municipal Council of Paris, through the Council of the Society for the Advancement of National Industry of France, to pronounce on an international and comparative investigation of all processes presented for rendering woods, fabrics and other combustible material uninflammable, and these chemists, after testing for eighteen months the materials submitted by Prof. Martin, consisting of painted woods in natural colors, fabrics, pasteboard, straw and paper, reported in his favor. To Prof. Martin, therefore, was awarded the prize for being the only inventor who submitted paints, processes and preparations fulfilling the stipulated conditions. These conditions were :

1. The substance or compound must be cheap and easy to apply.

2. It must not affect the tissues, nor the colors of the same, or such colors as might afterward be applied.

3 It must neither be poisonous nor corrosive.

4. It must not be affected by an excess of moisture in the air or by excessively dry air.

5. And, finally, the tissues or wood impregnated, after being exposed during one month to a temperature of 40° to 55° centigrade (104° to 122° Fahrenheit), must remain uninflammable.

The prize awarded by the Society was one thousand (1,000) francs, and a commemorative medal. Prof. Martin also received the personal congratulations of the President upon the results he had obtained. As a consequence of this competitive trial, the French Government adopted Prof. Martin's preparations, and their use was made compulsory in all theatres, opera houses, and places of public entertainment in France. Some of the theatres, where the original experiments in Paris were made, have now been prepared by the "Martin Process" more than nine years, and the various materials treated are still uninflammable. Among these houses are the Grand Opéra, the Nouvel Opéra Comique, the Vaudeville, the Gymnase, the Gaîté, the Châtelet, the Porte St. Martin, Renaissance, Ambigu, Variétés, Palais Royal and the Nouveautés.

In Italy, Prof. Martin met with a like success, Commander Ferry, Mayor of Turin, adopting them for the royal theatres, after the report of Prof. Oscanio Sobrero, member of the Royal Academy of Sciences, and Prospero Carlevaris, Professor of Chemistry in the Royal Industrial Institute, had indorsed them, in a long and elaborate report which they had prepared as members of a committee appointed by the Mayor to examine the best system for rendering stage scenes, canvases and wood incombustible.

An investigation conducted by a Royal Commission in Holland concluded in favor of the "Martin Process," and several theatres of Amsterdam and the theatre of Groningue were treated by it.

The various fireproofing preparations of Prof. Martin were first tried in experimental work, and exhibited in 1879, but were not perfected until 1885, when he secured letters patent. In 1889, various materials (experimental work), prepared in 1879, were tested and found uninflammable, the "Martin Process" receiving consequently two medals at that time. In all, it has been awarded twelve medals and diplomas. In the Universal Exposition, Paris, 1889, the restaurants in the Eiffel Tower, the Panorama Transatlantique, the Tower of Nesle, the Bull fighting Ring, etc., used the Martin preparations.

Besides the Fifth Avenue Theatre in New York, the "Martin Process" has been used in the Broadway Theatre, the (new) Union Square, the Madison Square Garden, Proctor's Twenty-third Street Theatre, Harrigan's, the Empire, the American and the Berkeley Lyceum. In these, the Martin preparations were the only ones that successfully passed the tests made by the Building and Fire Departments of this city, and their employment was approved. The additional security from fire derived from their use was recognized by the leading insurance companies accepting and writing the risks at reduced rates; the difference in premiums much more than paying the cost of materials.

As has been already stated, various prominent chemists have reported upon this fireproofing process in regard to its uninflammable and incombustible character, but Prof. James H. Stebbins, Jr., S.B., M.S., F.C.S., member of the German Society, Fellow of Chemical Industry, and member of the American Chemical Society, has called attention to the fact that, besides rendering substances non-inflammable, the Martin preparations possess also the remarkable property of being powerful antiseptics and disinfectants, and therefore animal and vegetable substances treated with them are protected against decomposition, putrefaction and decay.

Prof. L. M. Norton, of the Massachusetts Institute of Technology, in a letter accompanying his reports on the materials of this process, to Edward Atkinson, President of the Boston Manufacturers' Mutual Fire Insurance Company, says :

"Three-quarter inch kiln-dried pine was used in every experiment. I applied three coats of the solution, and, after drying, thoroughly tested the board, which I was unable to ignite by the flame of a Bunsen burner until the outer part was thoroughly carbonized. Treated with naphtha, and set on fire, the naphtha burned completely away without setting the b ard on fire. I applied two coats of paint to a board, and failed to ignite the board before it was carbonized in a Bunsen burner, and burning naphtha did not set the board on fire. The paint contains the salts made by the company, and a pure zinc white, properly ground in oil. I applied two coats of the calcimine, and find that it is very efficacious, and that in general all that I stated regarding the solution of the salts applies equally to the calcimine."

Prof. R. Ogden Doremus, after stating his preparation of the various solutions and pigments of the process, and in his application of them to various tissues, fabrics and wood, subsequently testing the effect produced upon them in reference to inflammability, gives the result of his personal trial as follows :

"Liquid No. 1. This solution was prepared and applied to lace curtains, calicoes, muslins, tarlatans, mosquito netting of different colors. The goods retained their characteristic properties and colors. All the tissues were rendered uninflammable.

"Liquid No. 2. Various papers, plain, printed, engraved, also written documents, were immersed in this solution without altering their appearance. When dried, they are uninflammable.

"Liquid No. 3. In this solution pieces of wood were soaked, others were placed in the liquid, and the air in the pores of the wood was rem ved by means of an air pump, the pressure of the atmosphere was then restored, thus forcing the saline solution to impregnate the wood more thoroughly. The specimens were then dried. Wood thus supersaturated will not only be uninflammable, but almost incombustible.

"Wood thus impregnated is admirably adapted for the construction of cottages, partitions, flooring in all houses, etc.; for the rail cars, preventing those fearful accidents of pers ns being burned when the cars are overturned and the hot coals start the conflagration. Trunks and other articles made of wood so prepared would be rendered permanently uninflammable.

"The application of this solution and others to the combustible parts of marine vessels would rob the ocean voyage of one of its greatest terrors.

"Liquid No. 4. This preparation was laid upon tissues and on wood. After several coatings had been applied, the various articles were tested by applying a Bunsen burner thereto. They were rendered uninflammable.

"Liquid No. 5. This composition was mixed with paint and with oils ; several coatings of this were applied by means of a paint brush to wood. The wood was rendered uninflammable.

"Liquid No. 6. Extinguishing liquid. This solution was prepared and injected on a mass of burning wood. A small quantity of liquid extinguished the fire and prevented reignition.

"The salts remained in tissues and wood, and the quality of uninflammability is permanently retained.

"I have tested specimens that were treated twenty months ago ; they were still uninflammable.

"Wood thus impregnated is also protected from destruction by dry rot, also insects.

"1. The Martin solutions accomplish the desired result of rendering tissues, wood and other combustible substances uninflammable.

"2. They are durable.

"3. They are easily applied.

"4. They are inexpensive.

"In conclusion, I am happy to state that I consider the invention of the chemist, Abel Jean Martin, of Paris, as not only scientific, but eminently practical.

"The compositions are the best known and most effectual for preventing and extinguishing fire."

It is the stage which is usually considered the most dangerous department of a theatre, in connection with the possibility of fire, and, in rendering its scenery so proof against that element of destruction, the Fifth Avenue Theatre is certainly most fortunate. Carelessness has probably a great deal to do with accidents of this kind in a theatre, but precautions taken such as those described guarantee an immunity from even that contingency.

The oil paints of the "Martin Process" are made from the best pigments in the market, and are sold as cheap as those of the best grade, besides having the necessary fireproofing qualities. The application is exactly the same as with ordinary paint.

Montauk Club House, Brooklyn, N. Y.

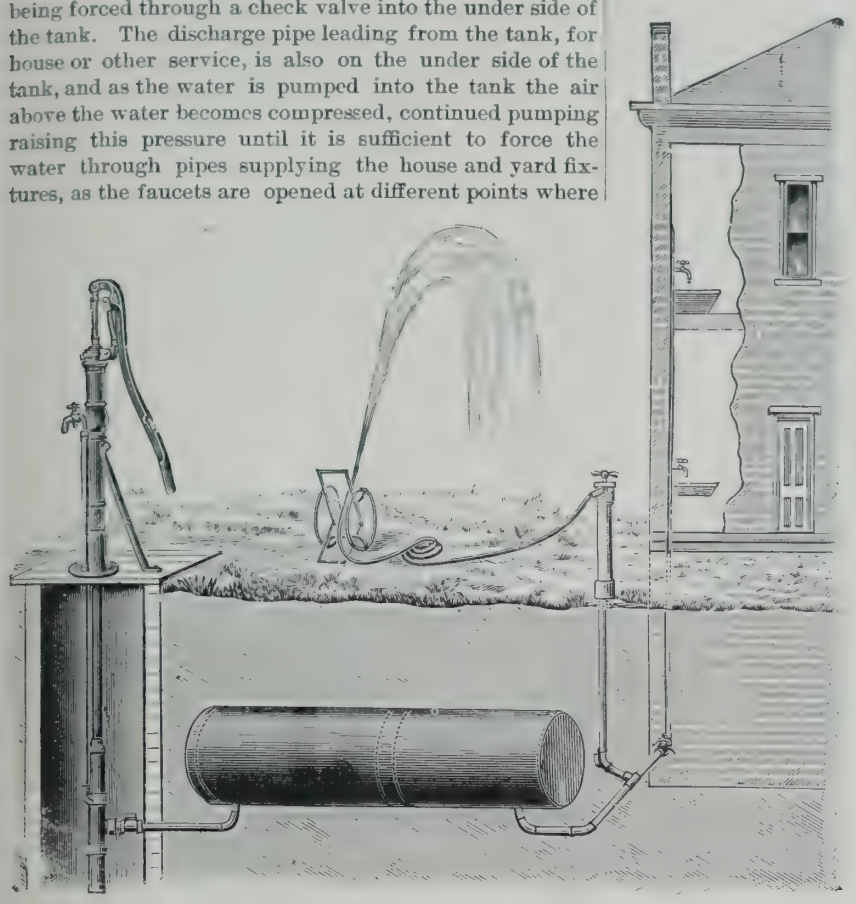
The instructions to competing architects were, says the *Building News*, to cover a plot 50 ft. by 90 ft. The prominent position which this building was to occupy, being near the entrance to Prospect Park, one end, the one with the large bay, bordering on the Plaza Circle, a favorite drive of Brooklyn people of an afternoon, called for a building of some architectural effect. The prevailing style of the private residences in the vicinity is the Romanesque. This made it imperative that the club should "change off" if it desired to hold up its head very proudly and prominently in the midst of so much richness of detail as had been portrayed in the Romanesque. There seemed to the architect much in Venice which might be adapted, as balconies and loggias belong as much to his climate as Venice, and American club houses are not complete without them. The style afforded strong coloring in the materials used, although in this instance violent contrasts were avoided. In the first story alternate colors of brown sandstone and the English Runcorn stone are used, but barely distinguishable, although enough to give texture to the wall surface. Above is used a yellowish red brick, the relief work in red and buff terra cotta, the buff predominating. The roof is covered with vitrified Spanish tiles of a dark reddish brown, harmonizing with the wall treatment and presenting a strong sky-line. The balcony at the fourth story level encircles the building and is of metal. The most prominent terra cotta enrichment is the frieze just under this balcony. The subject was suggested by the name of the club, which name belongs to a tribe of Indians who were settled in this region before the Colonial times. The subject begins with mythologic and legendary stories of these Indians, and ends with pictures suggested by Colonial history. The figures are of yellow with a red background. In the arrangement of the interior the intention was to place in the basement the bowling alleys, on the first story the conversation and morning rooms, the second the billiard and card rooms, the third various dining-rooms, including the ladies' dining-room and ladies' parlor, the fourth the sleeping apartments, with a "jolly room," so called, where it is expected members will retire for quiet chats and smokes. On this floor are the kitchen and pantries, connected by dumb waiters with the serving rooms and dining rooms in the story under. Thus each story has its purpose. On the first one enters and holds conversation, above he plays his games, up another flight of stairs he dines, and when he would steal away for quiet enjoyment with some boon companions, the fourth floor with its "jolly room" awaits him. From the billiard room is a loggia connecting with an open balcony, from the dining-room there is another balcony, and the fourth floor has the broad balcony which encircles the building for a promenade. The first floor is finished entirely in mahogany, the second story in oak, and the third treated in white and gold. After an occupancy of over a year, the arrangements have been found all that could be desired, and seems to secure the perfection of a social club house. F. H. Kimball, architect, New York.

A Dwelling at Montclair, N. J.

In our July number we gave a description and photographic views of a house at Montclair, N. J., the cost of which, by some error, was given at $5,500, whereas the correct figures are $7,500. Probably the error would be noticed at once by any builder, as the house is a large one and the plans especially desirable.

A NOVEL SYSTEM OF DOMESTIC WATER SUPPLY.

The method of supplying water for domestic use shown in the illustration presents many advantages. The water is lifted by pumping from a well or spring, or other source of supply, to a thoroughly tight underground steel tank, being forced through a check valve into the under side of the tank. The discharge pipe leading from the tank, for house or other service, is also on the under side of the tank, and as the water is pumped into the tank the air above the water becomes compressed, continued pumping raising this pressure until it is sufficient to force the water through pipes supplying the house and yard fixtures, as the faucets are opened at different points where the water is required for use. It is said that a man of average strength can thus pump into a tank of any capacity until the pressure will be 65 pounds to the square inch. The tank is placed far enough underground to obviate danger from freezing, and thus also keeps the water at a uniform temperature. The tanks are made in sizes ranging from six barrels to 100 barrels capacity each. Those wishing further details should address the manufacturers, Messrs. Kirtley Brothers, No. 1213 Walnut Street, Kansas City, Mo.



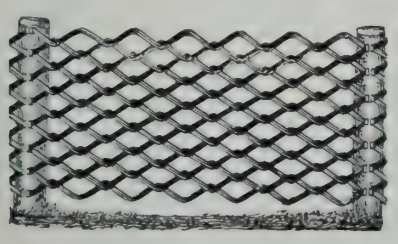
A HOUSE WATER SYSTEM OPERATED BY COMPRESSED AIR.

WOOD MANTELS AND ORNAMENTAL FIREPLACES.

Our illustration represents a carved wood mantel, made in either cherry or oak, with a fireplace, in which is an Eastlake polished brass frame, standard grate and radiant grate setting. The mantel is one of a large variety of specimens of such work to be found in the handsome illustrated catalogue of Messrs. Innes & Co., of Cincinnati, who claim to have the largest and most select line of wood mantels and fireplace furnishings to be found in the United States. The damper is so arranged that it can be held at any desired point, enabling one to regulate the draught of the chimney, and when the fireplace is not in use the flue can be entirely closed, preventing any escape of soot and fine ashes into the room. The firm makes all kinds of special designs for architects, manufacturing, also, a line of comparatively low-priced mantels for the retail trade.

FENCING MADE OF SHEET METAL.

Good fencing is an indispensable requisite to every well regulated farm, or lawn, whether the area is one acre or 100 acres. There is but little difference between the first cost of a good and a poor fence, and the latter will more than overbalance this in after years in cost for necessary repairing. In point of durability, economy, beauty, and general utility, Expanded Metal, as shown in the illustration, constitutes one of the latest improvements in fences, and affords one of the best fencing materials ever invented. The fence is formed of diamond shape meshes, cut from sheets of soft, tough steel. Each mesh is entirely independent of all others, and cannot unravel, as they are solid at all points of intersection. While light and



neat in appearance, it is practically indestructible. It is easily erected, requires no stretching to put in place, and there are no loose ends or sagging strands as in the wire fence. It is equally well suited for gates, window guards, tree-boxes, poultry yards, corn cribs, etc.

The use of Expanded Metal does not end with fencing. When cut in oblong meshes, it is particularly adapted for plastering purposes, and the most skillful builders and architects pronounce it far superior to any lath in use. It prevents cracks or falling plaster, and reduces the fire risk to the minimum.

This material is manufactured by the Central Expanded Metal Co., at 531 Wood St., Pittsburgh, Pa., and is sold by all leading hardware dealers. The manufacturers publish an illustrated book of particulars, showing the various uses and designs of Expanded Metal, which they send to any one upon application.

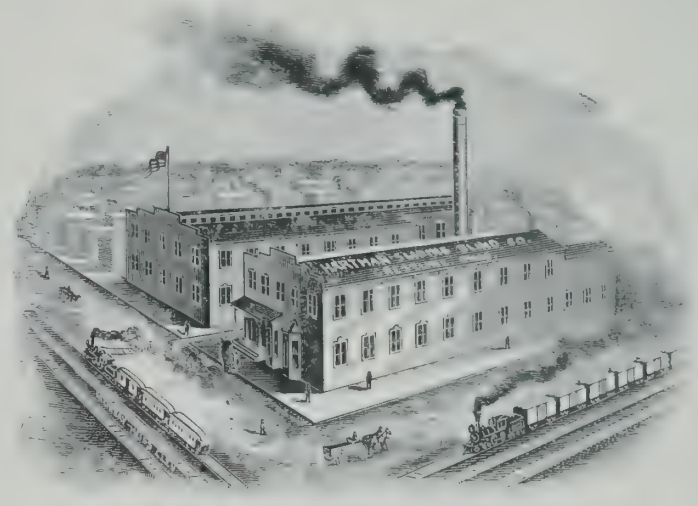
A MARBLE SLAB, ½ inch thick, weighs per sq. ft., 7.17 pounds; ¾ inch, 10.75; 1 inch, 14.32; 1¼ inch, 17.92; 1½ inch, 21 05; 1¾ inch, 25.08; 2 inch, 28.67; 2½ inch, 35.83.

THE HARTMAN SLIDING BLIND.

The Hartman patent sliding blinds have gained an enviable reputation throughout the United States and foreign countries. The manufacturers are the patentees and owners of patents on an inside window blind, which is so constructed as to slide up and down in a window frame inside the sash, and operate similarly to the sash; they are sustained at any elevation in the window desired by means of concealed springs working in grooved strips or guideways placed on the window jams, which are furnished with the blinds. The blinds are made of wood of various kinds, the selection of which the purchaser may determine. Great skill is manifested in the various designs and combinations in which the blinds are constructed, with rolling slats and panels, etc., and many other designs which are fully illustrated and explained in their new edition 100 page illustrated catalogue, which is mailed to any one on receipt of four cents in stamps to cover postage.

These blinds are durable, ornamental and convenient, and can be removed from a window in a moment without the loosening of a nail or a screw, and are just as easily replaced again.

The company has been engaged for years in the manufacture of these blinds, and also makes a specialty of the higher grades of soft and hard wood interiors of all kinds, stairwork, office fixtures, etc. Architects desiring their ideas executed in full accordance to details and specifications are invited to correspond with them. They also manufacture window and door screens in large varieties of designs, plain black enameled, green, ornamental or landscape wire cloth. The company has recently removed from Wooster, Ohio, to Crestline, Ohio, in which place they have built new and commodious factories, a view of which is shown in the illustration.

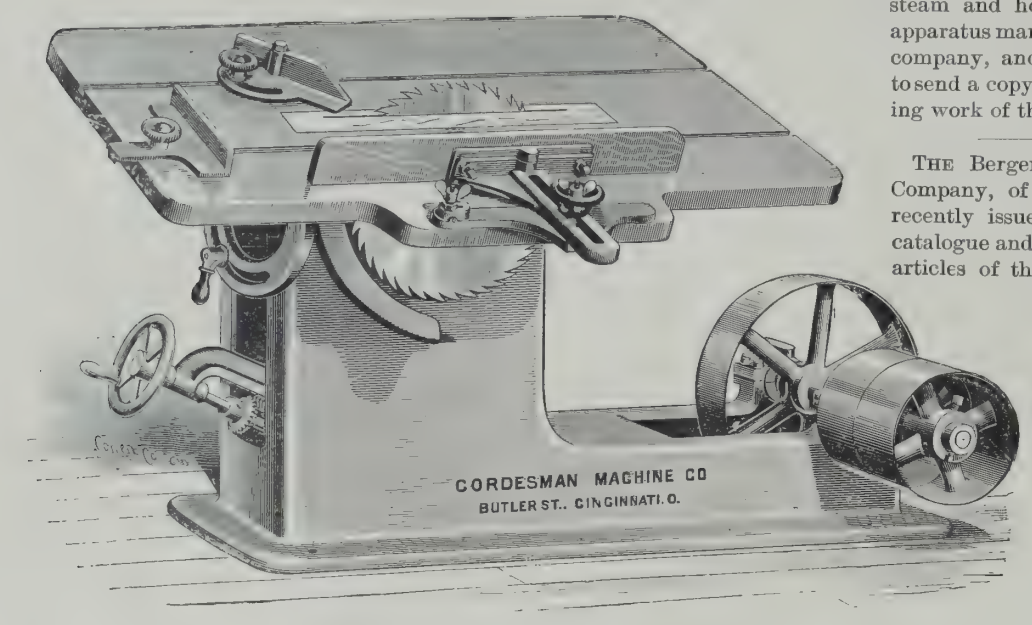


FACTORIES OF THE HARTMAN SLIDING BLIND CO.

AN ORNAMENTAL WOOD MANTEL AND EASTLAKE FIREPLACE.

AN IMPROVED DIMENSION SAW.

The machine shown in the accompanying illustration is designed to rip, crosscut, and make mitres with a facility which recommends its use in all kinds of woodworking establishments. It is heavy, self-contained, and the saw has a vertical adjustment, while the table may be tilted to 45 degrees. The frame is cast in one piece, making it superior in strength and rigidity, and an extension to carry countershaft is cast in it, necessitating but a single alignment in setting machine. A saw guard to prevent accidents is also provided. The table measures 4 feet long, 3 feet wide, and is substantially ribbed. Grooves are planed in it for the reception of crosscut and mitre fences. The opening for cutters to pass through is large enough to admit of the use of a 20-inch saw. Two turned



A DIMENSION SAW, WITH IRON TILTING TABLE.

dovetailed radii fitted to under side of table gives it a tilting movement and substantial bearing. Degree marks are cut in front radius, indicating angle of table while being tilted. The arbor is of large diameter, revolves in long self-oiling boxes, and is made of refined machinery steel. The boxes are connected and fitted to dovetailed inclined frame, gibs being provided to take up wear. By means of handwheel and screw the saw may be adjusted to suit various thicknesses of material, and at such an angle that there will be no variation in length of belt.

The patent ripping fence is clamped to table, and may be speedily adjusted to allow material up to 18 inches wide to pass between it and the saw. It has a rack and pinion movement operated by small handwheel, and when placed in proper position it is held firmly by thumbnut. This fence is so made that it can always be kept in line with saw, or if desired may be swayed a little one way or the other.

This machine is manufactured by the Cordesman Machine Co., 24 to 34 Butler Street, Cincinnati, Ohio.

PLUMBERS' AND STEAM-FITTERS' SUPPLIES.

The Haines, Jones & Cadbury Company, of Philadelphia, have just issued a new Sanitary Catalogue. The volume is an exceedingly handsome one, bound in cloth, 13½ x 10½ inches, and contains 216 pages of the very best enameled paper, on which are illustrated the many sanitary specialties manufactured and imported by this old established firm. The engravings give a most complete list and description of porcelain-lined baths, both with wood rim and roll rim, the latter showing the outside enameled in ivory and gold bands. The accompanying illustration represents one of the many elegant styles of bath tubs made by the company. The catalogue should be in the hands of every plumber, and will be sent on application.

E. T. Barnum, Detroit, Mich., has just issued a new 120 page catalogue, showing improved and artistic designs, covering almost every conceivable form of wire and iron work for building and decorating purposes, such as roof cresting, weather vanes, tower ornaments, iron and wire fences of every description, reservoir vases, lawn settees, chairs, statuary, wire arches, trellises, fountains, summer house, bank and office railings, grilles for interior and exterior decoration, window guards, vault doors, balcony railings, iron stairs, columns, iron bedsteads, jail cells, stable fixtures, hitching posts, grave guards, sidewalk lights, wire signs, elevator inclosures, folding gates, etc. Mr. Barnum has been established for nearly thirty years, and is constantly adding new designs to his catalogue, which is gotten up with a view of meeting the special requirements of the trade. It will be mailed free upon application.

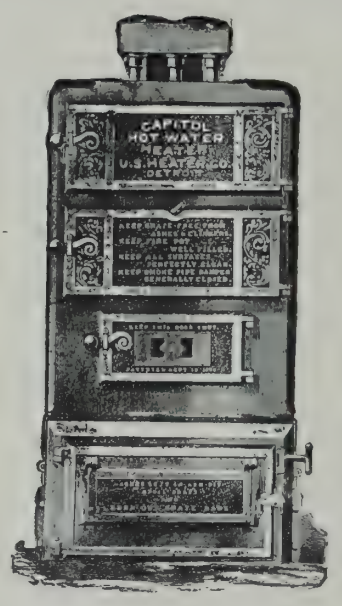
The Richmond Stove Co., of Norwich, Conn., has just issued a neatly bound pocket catalogue and price list, with illustrations and description of the several lines of steam and hot water heating apparatus manufactured by the company, and will be pleased to send a copy to any one desiring work of this nature.

The Berger Manufacturing Company, of Canton, O., has recently issued an illustrated catalogue and price list of the articles of their manufacture, which it would be well for all architects and builders to have, as the new catalogue supersedes all others. Among the specialties of the company are Berger's patent eaves trough, hangers, corrugated and plain conductor pipe, ridge capping, cornices, window caps, etc., steel roofing, corrugated iron siding, steel brick siding, and patent ceilings and shutters. The World's Columbian Exposition Machinery Hall is roofed with Berger's patent steel roofing, and this is said to represent the largest quantity of steel roofing on any building in the world.

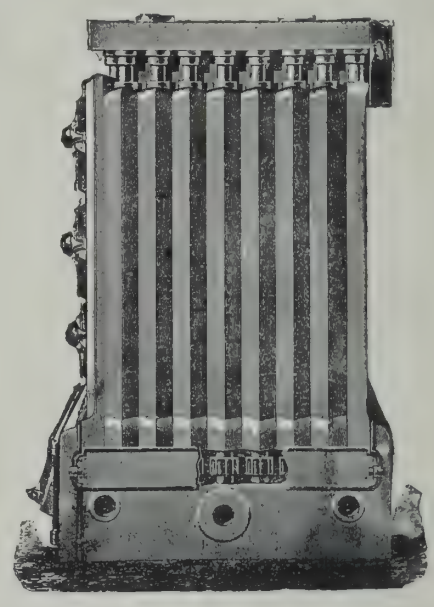
The Cortright Metal Roofing Co., of Philadelphia and Chicago, in their advertisement of this issue direct attention to their Patent Improved Valley. Heretofore their patent valley has been made with one fold on each side, to which the slates or shingles were attached. The improvement consists of an extra fold on each side, thus forming double protection against driving storms. The folds provide amply for expansion and contraction of the metal. While this valley is especially intended for use with their metallic tiles, shingles, etc., yet it is also used extensively with wood shingles and slate. It can be supplied in any weight of copper or brand of roofing tin. Full information and prices will be furnished by the above company on application.

THE CAPITOL HOT WATER HEATER.

The accompanying cuts show the 1893 pattern of the Capitol Hot Water Heater, manufactured by the United States Heater Company, Detroit, Mich. The record of these heaters for efficiency during the severe weather of last winter was all that could be desired. The grate and the shaking arrangement have, however, been improved, and the fastenings of all the doors changed, as shown by the cut. In the new pattern there is sufficient space between the front of the heater and the next intermediate section to permit soot and ashes, when brushed from the inner surfaces, to fall into the firepot, thus preventing

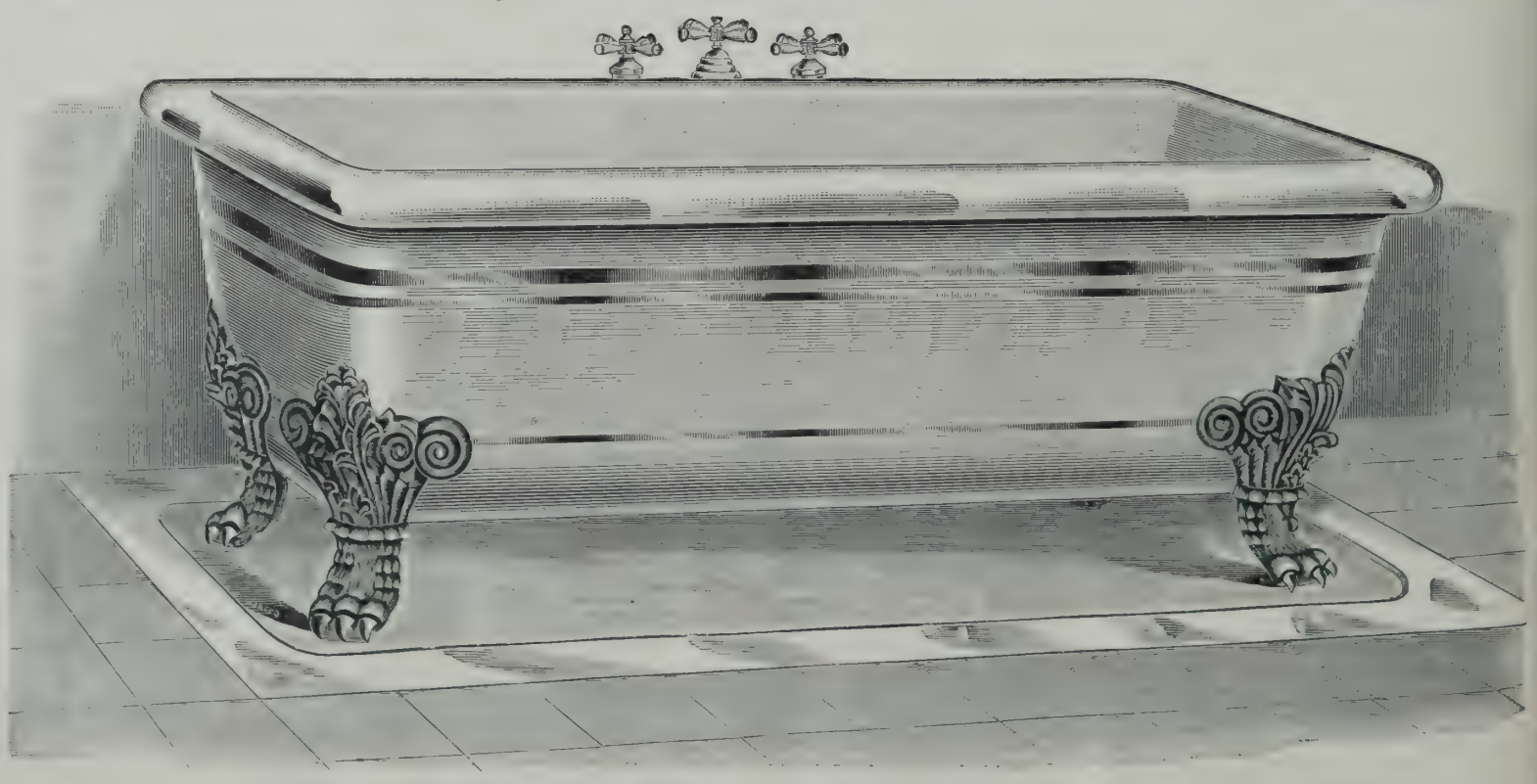


their escape into the cellar. As shown by the side view, the smoke pipe will hereafter be taken out at the rear of the heater instead of extending up above the top, thus permitting the heater to be placed in lower cellars than was formerly possible. The side plate, which formerly



covered the top connections, will now be inside of these connections, so that they will not be exposed to the heat of the fire. These little points, while not affecting the general operation of the heater, are designed for the convenience of the fitter.

Mallory's Standard Shutter Worker, manufactured by the Mallory Manufacturing Co., of Flemington, N. J., is especially worthy of attention by all persons having buildings in course of completion, and house holders whose windows are not so fitted. The device is strong, simple, durable, and inexpensive, and easily placed on old as well as new houses. It is a wonderful convenience. See their card in our advertising pages.



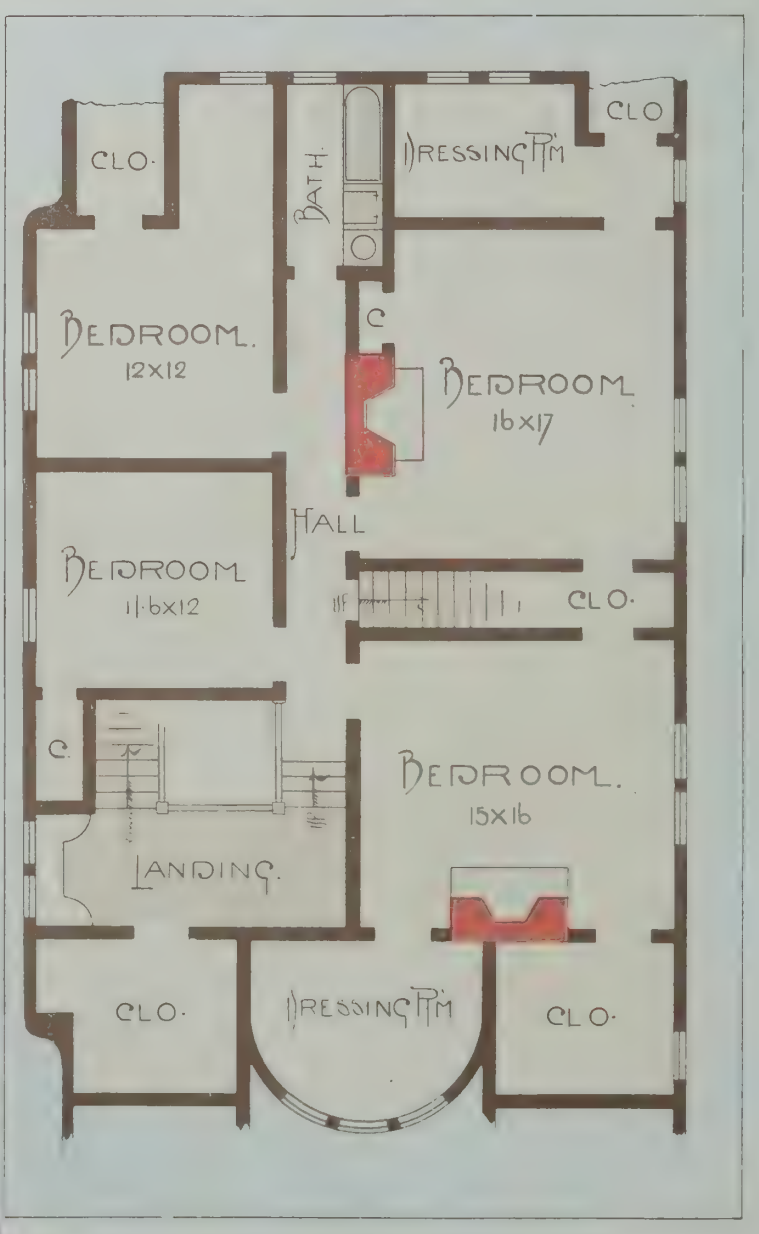
THE CAMBRIAN ROLL RIM PORCELAIN ENAMELED IRON BATHS.



A COTTAGE AT GREENWICH, CONN.



FIRST. FLOOR.



SECOND. FLOOR.

A RESIDENCE AT SPRINGFIELD, MASS.



SCHUMACHER & ETTLINGER, NEW YORK

SCIENTIFIC AMERICAN

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A COTTAGE AT GREENWICH, CONN.—See page 32.

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NEW YORK, SEPTEMBER, 1893.

THE

Scientific American,

ARCHITECTS AND BUILDERS EDITION.

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This is a special Edition of THE SCIENTIFIC AMERICAN, issued monthly. Each number contains about forty large quarto pages, forming, practically, a large and splendid **Magazine of Architecture,** richly adorned with *elegant plates in colors* and with fine engravings; illustrating the most interesting examples of modern Architectural Construction and allied subjects.

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Bound Volumes.—Two volumes are published annually. Volumes 1 to 15, which include all the numbers of this work from commencement to June, 1893, may now be obtained at this office or from Booksellers and Newsdealers. Price, bound in paper, $2.00 per volume. These volumes contain all the colored plates, and all the other interesting matter pertaining to the work. They are of great permanent value. Forwarded to any address.

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A RESIDENCE AT GREENWICH, CONNECTICUT.

We present, as a subject of one of our colored plates in this issue, a residence erected for Miss E. L. Kirtland, at Greenwich, Connecticut. On page 31 we also present an additional view of the same dwelling. The building is treated in a unique style, and is suitable for a rural district. The underpinning and first story is built of rough, rock-faced stone, laid up at random. The posts at front and rear porches are built of similar stone. The second and third stories are covered on the exterior with shingles, left to weather finish. Roof shingled. Dimensions: Front, 32 ft.; side, 57 ft., including front and rear porches. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. Within the house the arrangements are most complete. Main hall is trimmed with quartered oak. The walls are wainscoted in panels, and the ceiling are heavily beamed. The staircase is built from a special design, and is provided with a carved newel. Library is also trimmed with oak. It has a fireplace built of brick, with tiled trimmings and an oak mantel. Bookcases are built in. Parlor is trimmed with mahogany, and it contains a fireplace, with mantel, mirrors, etc. Dining-room, trimmed with oak, has wainscot and ribbed ceiling. Fireplace is built of brick, with hearth laid of same. Kitchen is wainscoted and trimmed with white pine, and is furnished with the usual fixtures, large closets and butler's pantry complete. The second floor contains four bedrooms, two dressing-rooms and bathroom, and the third floor contains two bedrooms and trunk room. These apartments are trimmed with white pine and are finished natural. Bathroom is wainscoted. Cemented cellar contains laundry, furnace, and other necessary apartments. Mr. Wilbur S. Knowles, architect, New York City, N. Y.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT SPRINGFIELD, MASS.

One of our colored plates presented in this issue illustrates a residence recently completed for W. H. McKnight, Esq., on Worthington Place, Springfield, Mass. On page 39 we give an additional view and plan of the house. The design is treated in the Queen Anne style, and it has a well shaded piazza, balcony, tower and chimneys. The underpinning and exterior wall at library is built of rock-faced Longmeadow sandstone. The exterior framework above is covered with sheathing, felt paper, and shingles. Roof shingled. Dimensions: Front, 48 ft. 6 in.; side, 49 ft., not including piazza and porch. Height of ceilings: Cellar, 7 ft. 6 in.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. The interior arrangement is most complete. The vestibule and hall are trimmed with quartered oak, the former having paneled walls and ceilings, and a floor laid in mosaic. The hall has a paneled wainscoting and ceiling beams, forming deep panels. The arcaded effect provided by the columns is the feature of hall. These columns and posts to staircase extend to ceiling. They have carved capitals, above which are placed ornamental brackets supporting a spindle transom. The staircase is provided with a spacious landing, and is lighted by a cluster of stained glass windows. Parlor and library are trimmed with cherry, and they are provided with large open fireplaces, furnished with tiled hearths and facings and hardwood mantels. Dining-room is trimmed with quartered oak. It has a paneled wainscoting and a ribbed ceiling, and is also provided with a buffet, built in and elegantly carved. Kitchen, butler's pantry and rear hall are trimmed with ash. These apartments are wainscoted and provided with the usual fixtures in the best possible manner. The second floor, trimmed with sycamore, contains a large hall, four bedrooms, nine closets, dressing-room and bathroom, the latter being wainscoted. The third floor is trimmed with whitewood, finished natural. It contains billiard-room, two servants' bedrooms and bathroom and storeroom. Cemented cellar contains laundry, furnace and other necessary apartments. Cost $11,500, complete. W. H. McKnight and F. Maher, architects, same place.

Our engravings were made direct from photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A DWELLING OF MODERATE COST.

We present, on page 34, a dwelling of low cost, recently erected for Louis B. Parsons, Esq., at Rutherford, N. J. The design is treated in the Colonial style. It has a pleasant piazza, bay windows and flower balcony. Underpinning is built of local brick laid in red mortar. The first story is clapboarded and painted Colonial yellow, with white trimmings; second story shingled and stained sienna; roof shingled and painted red. Dimensions: Front, 26 ft. 6 in.; side, 32 ft., not including porch and piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The interior throughout is trimmed with whitewood, finished natural. Hall contains an ornamental staircase, with newel and candelabra. This hall and staircase are lighted effectively by windows glazed with delicate tinted glass. The arch between hall and parlor is provided with a transom filled in with spindlework. Parlor is furnished with a hardwood mantel of excellent design. The fireplace in dining-room is fitted up with a tiled hearth, facings, grate, and a similar mantel. Kitchen and pantries are wainscoted, the former containing fireplace for range, wash trays, sink, etc. The second floor contains three bedrooms and bathroom. Bathroom is wainscoted and fitted up replete. The rear bedroom could be enlarged at a small expense by extending it over back porch. There is one bedroom (12 x 12) on third floor, besides ample storage. Cemented cellar contains furnace and other apartments. Cost, $3,476, including all improvements complete. Mr. H. Galloway Ten Eyck, architect, Newark, N. J.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A DWELLING AT BRIDGEPORT, CONNECTICUT.

We present on page 35 a dwelling recently erected for J. Munson Tomlinson, Esq., at Bridgeport, Conn. The design shows a building of good proportions, constructed of good materials, in a thorough, workmanlike manner. The underpinning is built of local rock-faced bluestone. The building above, of wood, is covered with clapboarding and shingles. The clapboarding is painted light brown with dark brown trimmings, and the shingles are painted a tile red. Roof shingled and painted red. Dimensions: Front, 33 ft.; side, 30 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The interior arrangement is most complete, and the rooms are large, well lighted and finished in a handsome manner. They are trimmed throughout with whitewood, finished natural. Hall contains an ornamental staircase, with a massive carved newel. The various apartments on the first floor are separated by archways, provided with ornamental spindle transoms. Parlor has a fireplace, with tile trimmings and a hardwood mantel. Library and dining-room have fireplaces built of brick, with facings and hearths of same, and furnished with oak mantels. Butler's pantry and kitchen are trimmed and wainscoted with North Carolina pine, and are fitted up in a most complete manner. There are three large bedrooms, five closets, alcove and bathroom on second floor. Bathroom, spacious, is wainscoted and fitted up replete. Third floor contains two bedrooms and trunk room. Cemented cellar contains furnace and other apartments. Cost $2,775 complete. Mr A. M. Jenks, architect, Brooklyn, New York.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE NEAR BOSTON, MASS.

We illustrate, on page 36, a dwelling recently completed for Washington Q. Taylor, Esq., near Boston, Mass. The design is treated in the Queen Anne style. It has an underpinning built of rock-faced stone, while the building above, of wood, is covered with shingles, stained sienna. The trimmings are painted white and the blinds bottle green. Roof shingled, and left to finish natural. Dimensions: Front, 29 ft. 10 in.; side, 47 ft. 2 in., exclusive of piazza and porch. Height of ceilings: Cellar, 7 ft; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The interior throughout is trimmed with whitewood. The hall staircase landing has a screen of balusters, separating it from hall with paneled work below running down to floor. This work is extended forward to the front of staircase, and forms a buttress, doing away with balusters and rail. The parlor is treated in cream white, and it has an Old Colonial mantel. The fireplace is trimmed with tiles. The woodwork in the other apartments is finished natural. Dining-room has a bay window, and contains a fireplace built of brick, with tiled hearth and a hardwood mantel. Kitchen and laundry are wainscoted and furnished with the usual fixtures complete, and the pantries are also fitted up in the same manner. The second floor contains four bedrooms, with large closets and bathroom, the latter wainscoted and provided with bowl, closet and tub. Two bedrooms and trunk room on third floor. Cemented cellar contains furnace and other necessary apartments. Samuel J. Brown, architect, Boston, Mass.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

IN our July number, page 5, we illustrated the Syrett house, at Montclair. By a misprint the cost was made $5,000 when it should have been $7,000.

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Messrs. Munn & Co., in connection with the publication of the **Scientific American,** continue to examine improvements and to act as Solicitors of Patents for Inventors.

In this line of business they have had *forty-eight years' experience,* and now have *unequaled facilities* for the preparation of Patent Drawings, Specifications, and the prosecution of Applications for Patents in the United States, Canada, and Foreign Countries. **Messrs. Munn & Co.** also attend to the preparation of Caveats, Copyrights for Books, Labels, Reissues, Assignments, and Reports on Infringements of Patents. All business intrusted to them is done with special care and promptness, on very reasonable terms.

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A $2,500 COTTAGE.

We publish on page 37 a cottage of low cost, erected for D. H. McKay, Esq., at Allston, Mass. The design shows a modest cottage, Colonial in treatment, with pleasant porch and an interior well arranged. The underpinning is built of local bluestone. The exterior above, of wood, is covered with clapboards and shingles. The clapboarding is painted Colonial yellow with ivory white trimmings; shingles are stained sienna. Roof shingled and painted red. Dimensions: Front, 24 ft. 6 in.; side, 37 ft. 6 in., not including front porch. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft.; third, 7 ft. The interior throughout is trimmed with whitewood. Parlor is treated in China white. It contains a fireplace built of brick, with hearth laid of same and provided with a neat wood mantel of Colonial style, with columns, etc. The woodwork in the other apartments is finished natural. Hall contains an ornamental staircase, the posts of which extend to ceiling. Spindle transoms are built in between these posts. The dining-room is spacious and well lighted. It has connection to kitchen through butler's pantry, which is fitted up complete with shelves, drawers and cupboards. Kitchen is wainscoted and provided with sink, wash trays, etc. Lobby is large enough to admit ice box. There are four bedrooms and bathroom on second floor. Bathroom is wainscoted and fitted up with the usual fixtures complete. Two bedrooms and ample storage on third floor. Cemented cellar contains furnace and other apartments. Cost $2,500. A. W. Pease, architect, Boston, Mass.

Our engraving was made directly from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

AN ENGLISH VILLA.

We give on page 42 an illustration of a new villa recently erected on the Barbourne Park estate, Worcester, for Mr. Herbert Caldicott, City Sheriff. The outside is faced with Severn side bricks, with Adderley Park moulded bricks, and ornamental panel bricks. The gables are treated in oak timber work and tile hanging, and the roofs are covered with dark Broseley tiling. The interior is fitted up in keeping with the exterior. The principal staircase is of pitch pine, and the remaining joinery of red deal. The whole has been carried out from drawings and details by Mr. John Henry Williams, architect, Worcester, and under his superintendence. We are indebted for our illustration to the *British Architect.*

SKETCHES IN MALLORCA.

One of the special charms of the picturesque town of Palma, says *The Building News*, are the numerous courtyards, not two of which are alike. The earliest are Gothic in character: then many in Renaissance style; others a strange mixture of the two preceding manners; and the more recent ones, though attractive, with no distinguishing architectural features. Every house of any kind of pretension has a courtyard, which you enter from the narrow street by a large gateway. One, two, three, or all four sides of the yard are arcaded; and invariably a stone staircase leads to the upper floor, no second floor existing above it. The columns supporting the arches, often of Brescia marble, quarried in the island, are squat and bulgy in shape, with capitals generally too large. The arches have a wide and flattish span, giving to the newcomer the impression of weakness, specially as in the view given of the yard of the Casa de Oleza; the arch supports two columns, which in their turn support the flat roof that shelters the staircase. Nowhere in these Majorcan courtyards do you come across pure style or fine proportion; still, the effect produced is pleasant, from its having a character of its own, and eminently pictorial in aspect, several suggesting scenes such as Paul Veronese delighted in. In most of these yards are wells, with elaborate ironwork. The well serves to draw water from a tank underneath the yard, and supplied with water by an aqueduct still in use, and built by the Moors, which aqueduct brings beautifully clear water from a spring in the mountains nine miles off. The different doors in the yards lead to the stables, cellars, and storerooms, and in many shrubs and flowers are placed in pots about the yard, on the steps of the staircase, and along the open passage above the arch, where, in the Casa de Oleza, tressiwork is painted. Our illustration, page 42, is reproduced from the charming painting by Mr. W. F. Yeames, R. A., shown in last year's Royal Academy exhibition.



DESIGN FOR A SMITHY.

A COTTAGE OF LOW COST.

The engraving, page 38, shows a cottage of low cost, recently erected for D. H McKay, Esq., at Allston, Mass. The design has a pleasing exterior, with ample piazza room, and a unique plan, fitted up in a first-class manner. Underpinning, local stone. First story, clapboarded and painted light olive green, with bottle-green trimmings; second story, shingled and stained a dark brown; third story, shingled and finished similar; roof, shingled and painted red. Dimensions: Front, 23 ft. 6 in.; side, 36 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft The interior throughout is trimmed with whitewood and finished natural, with the exception of parlor, which is treated in ivory white. Hall has an ornamental staircase, with newel posts extending to ceiling, the space within being filled in with spindle transoms. This staircase is lighted by a stained glass window. Parlor has an open fireplace built of brick, with tiled trimmings, and a Colonial mantel, with columns. Dining-room is well lighted, and provided with a large closet. Kitchen and pantry are wainscoted and furnished complete Lobby is large enough to admit ice-box. There are four bedrooms and bathroom on second floor, and one bedroom and storage on third floor. Cemented cellar contains furnace, laundry, etc. Cost, estimated, $2,000. A. W. Pease, architect, Boston, Mass.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

DESIGN FOR A SHOP OR SMITHY.—We present herewith a tasteful design for a shop such as a smithy or blacksmith's shop, for which we are indebted to the *British Architect.*

The design is simple, yet rather striking, and the building might be erected at a moderate cost.

Wood Pavements.

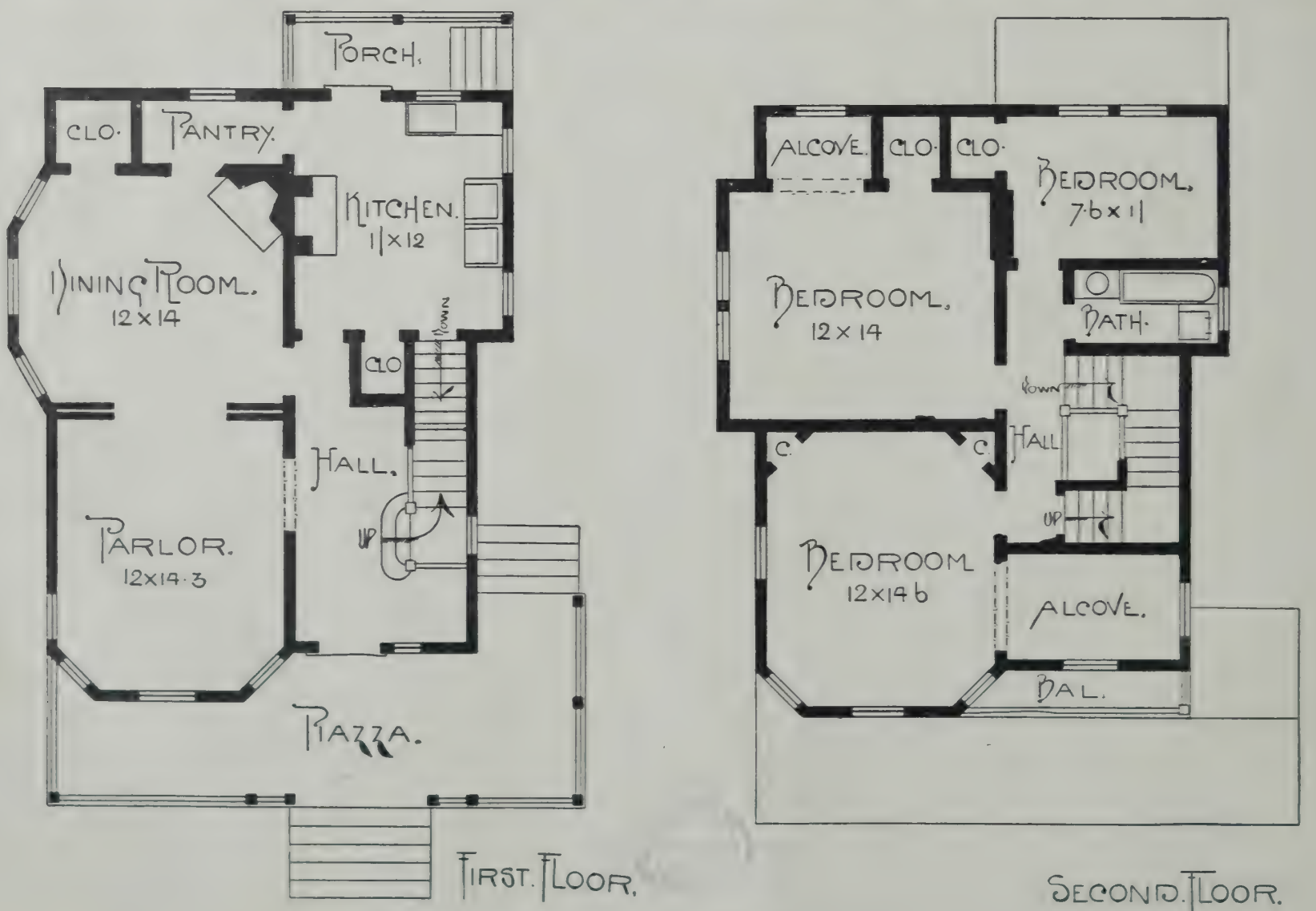
It is stated on good authority that upwards of forty patented systems of wood-paving have been introduced. The main differences between them are chiefly in regard to the shape of the blocks and the treatment. Besides rectangular blocks, square, round, hexagonal, octagonal, and other shapes have been tried, but the rectangular or the circular blocks, when well fixed on a solid foundation, are equal to any other form, the fibre of the wood being placed in a vertical position. The blocks should be well impregnated with the oil of tar or creosote; the mere dipping of the blocks in coal-tar or creosote oil is injurious, the *rationale* being that all sap should be expelled before the oil can be effectually applied to the wood. If the moisture cannot escape, fermentation takes place. The absorbent woods, such as cypress, pine, and cedar, are perhaps better adapted for the process of impregnation. In this country Baltic fir has been largely used, or yellow pine; in America cedar and cypress, on account of their cheapness, are employed. Hard woods are found to be slippery, and not to give so good a foothold as cedar and the pine varieties. The joints should be narrow, and a ¼ of an inch is enough; wider joints allow the fibres to spread, and thus they lose their rigidity. The best materials for filling are bitumen and hydraulic cement grout, the former used for filling the lower portion of the joint, and the latter the remainder to the top. A concrete foundation, with a coating of asphaltic mastic, ½ inch thick, has been adopted with success. Cedar blocks have been laid largely at Detroit, Mich., cylindrical in shape, from 9 inches to 5 inches diameter and 7 inches deep, these being set on a bed of bank sand and gravel, 6 inches deep, compacted with a roller weighing 2,400 lbs. The blocks, after being set, are rammed to a solid bearing with an 80 lb. hammer. The spaces are filled with screened gravel rammed with steel bars, and the surface is dressed with a coating of gravel and sand. Hexagonal blocks of mesquite have been used in paving in some of the Southern States, the foundation being 6 inches of cement concrete, with a cushioning of sand 1 inch thick. The joints are filled with sand or screened gravel. Cedar blocks without knots and bark, and of 6 inches long, and of a diameter of not less than 4 inches nor more than 10 inches, have been used in Minneapolis upon a floor of sound white pine plank 2 inches thick, laid lengthwise with close joints, and 8 inches to 12 inches wide and 14 feet to 16 feet long. Each plank must have bearings at the ends and centre upon stringers 1 inch by 8 inches bedded in the sand. The blocks are close-jointed, and then swept over by clean screen gravel. The objections urged against wood-block paving that it absorbs water and horse manure are untenable when the blocks are rendered impermeable to moisture. No doubt many roads of an absorbent nature have been laid, especially in America and New South Wales, where the systems of wood-block laying have been defective; but as Col. Haywood, the engineer to the City of London Sewers Commissioners, has stated, the wood pavements in the city have been free from any offensive emanations.

Lead as a Coating for Iron and Other Metals.

To 100 pounds of lead are added 5 pounds of aluminum, 2 ounces sal ammoniac, ½ ounce arsenic, ½ ounce of borax or 1 pound of alum, and 1 pound of cryolite. The alloy of lead, aluminum and arsenic gives a harder and more firmly adhering coat than is obtained in the ordinary process. The plates to be coated are cleaned and passed through the bath in the usual way.

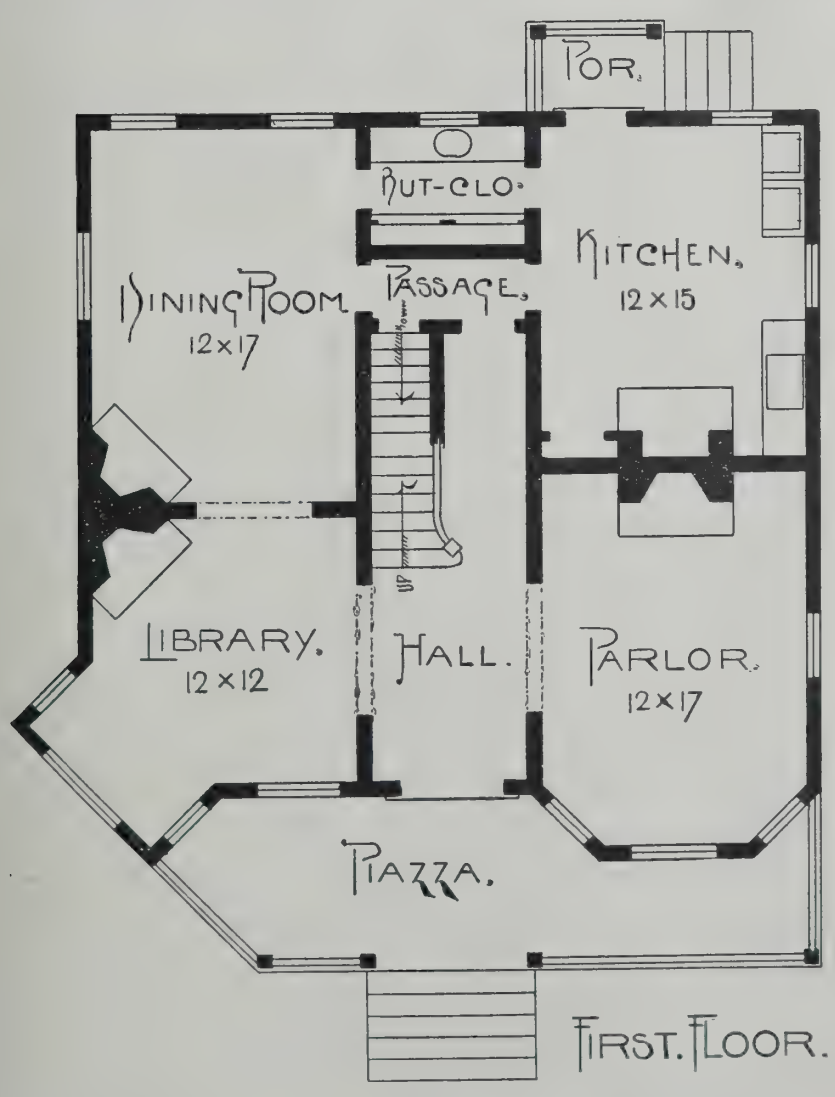
ONE of the rooms of the Press Bureau at the Chicago Exposition has its walls entirely papered with title pages of leading publications from all over the world. These publications include daily papers, religious and trade papers, magazines, etc. A central feature on this wall is the title page of the SCIENTIFIC AMERICAN. Every nation and nearly every colony in every part of the world is represented. The effect of this method of papering is remarkably good.



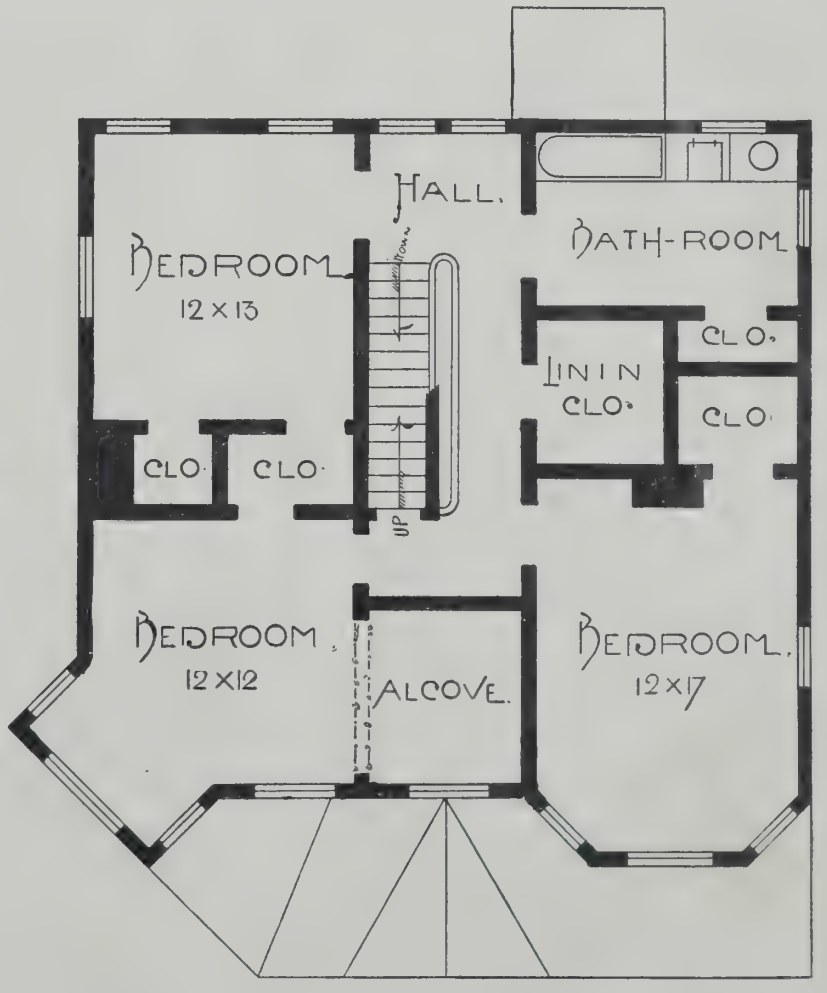


A DWELLING OF MODERATE COST.—See page 32.





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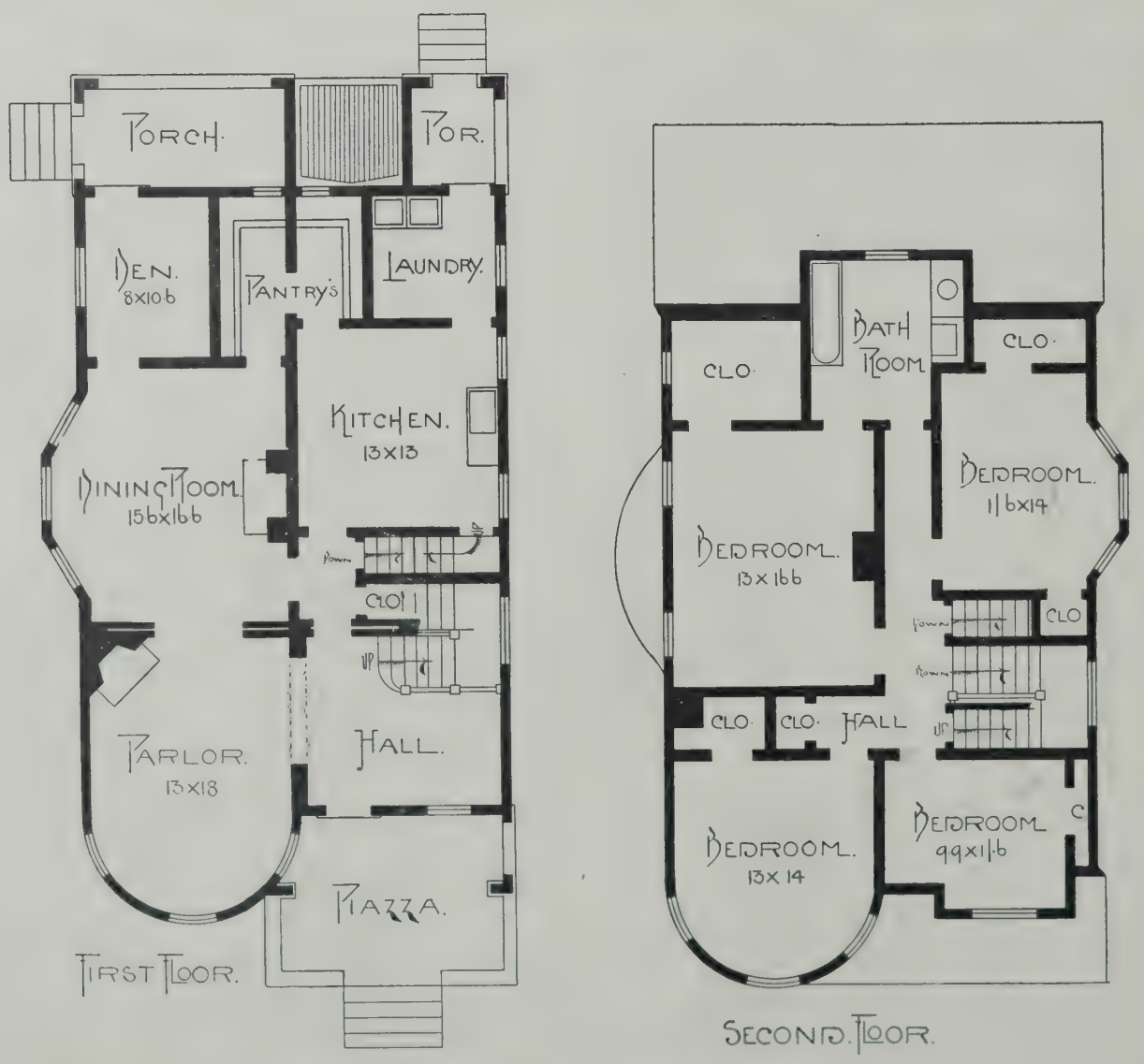


SECOND FLOOR.

A DWELLING AT BRIDGEPORT, CONN.—See page 32.

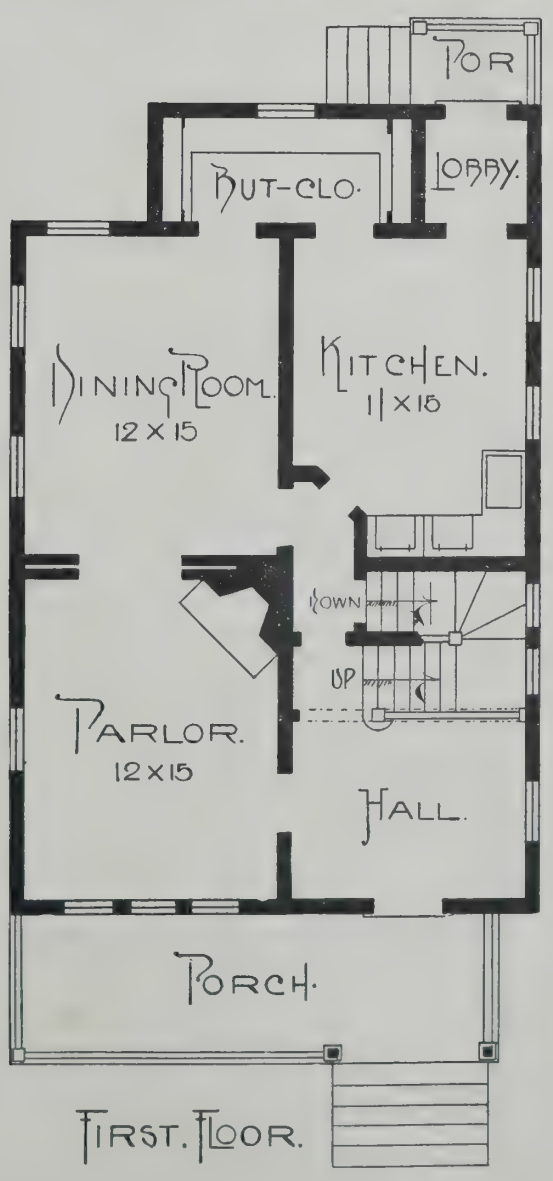
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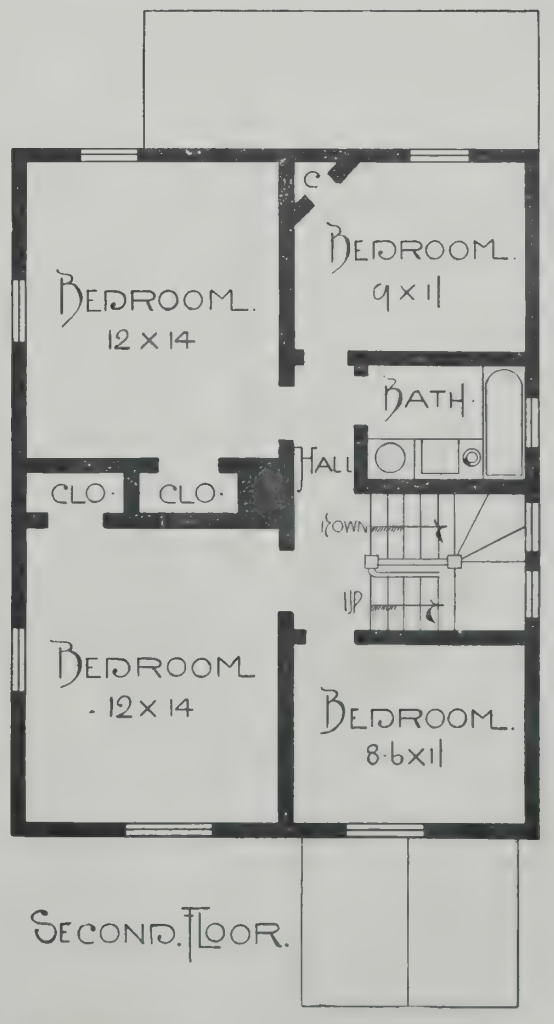




A RESIDENCE NEAR BOSTON, MASS.—See page 32.



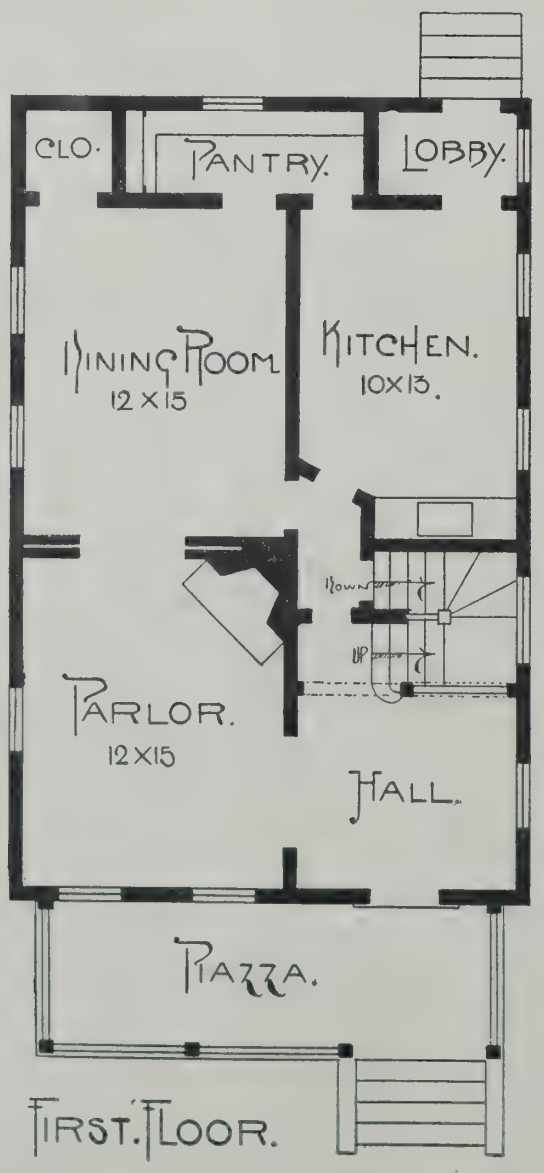




A $2,500 COTTAGE.—See page 33.

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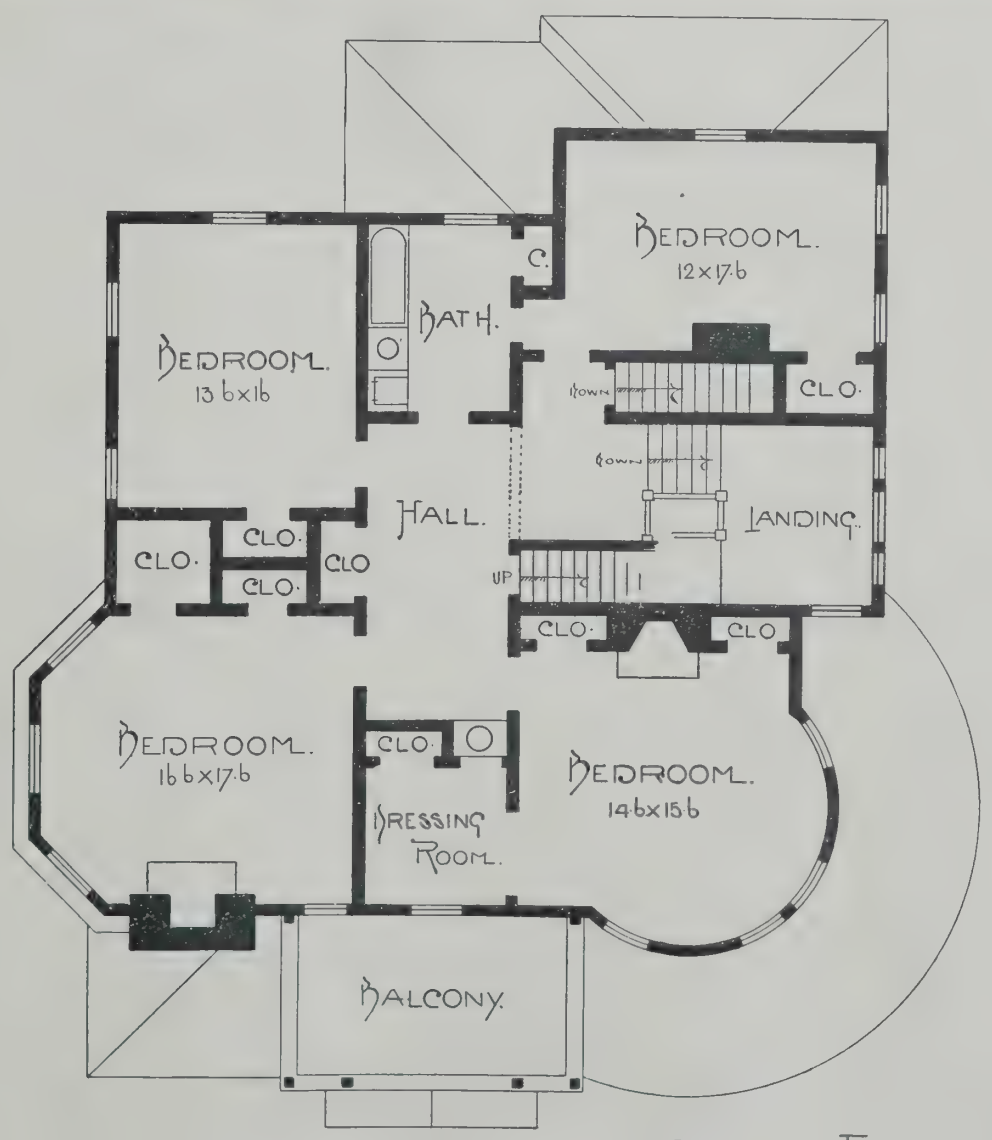






A COTTAGE OF LOW COST.—See page 33.





SECOND FLOOR.

A RESIDENCE AT SPRINGFIELD, MASS.—See page 32.

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The Fifth Avenue Theatre,

NEW YORK CITY.

BY HENRY M. STEVENS.

With this issue we bring to a close our illustrations and descriptions of this elegant structure. We will add but a few words respecting the cabinet work and the decorative work in plaster.

The Carpenter and Cabinet Work.

The entire carpenter and cabinet work of the theatre was executed by Messrs. H. Mandeville & Son. The work itself exhibits a very clever adaptation of the material to the result required in this case, which, while it made no immediate demands on the part of the contractors for anything of an elaborate character, conveys an idea of symmetry and appropriateness in every way creditable to its authors. It has been made both strong and durable—just as we should expect it to be—and is mechanically correct, as well as consonant with the style observed in the decorative scheme which renders the "Fifth Avenue" so welcome an innovation among our list of attractive theatres.

Though the ordinary carpenter work has less of an opportunity for display in a general way, in most buildings, than other work in finishing an interior, yet it is by no means an indifferent task, for it must exhibit honesty of purpose and soundness of material as well as mechanical skill. It is, therefore, not without problems. To solve these as effectively as Messrs. H. Mandeville & Son have done in the Fifth Avenue Theatre, is to establish an indisputable claim for first rank in the field in which they have been worked out so successfully.

The Plaster Work.

The plaster work of the interior of the Fifth Avenue Theatre has special accentuation in the panels over the proscenium boxes. A view of one of these panels, in connection with a section of the proscenium arch, and a small portion of the family circle, is presented here. The caryatides, together with the other relief work, indicate talent of no mean order on the part of the modeler, who proves himself an artist in the best sense of the word. The history of interior decoration during the last decade in New York and vicinity has been marked by a very significant advance in this particular department of plastic art, and Messrs. J. & J. Morrison have led the way in its superior development. Not only in their plaster work of the present theatre is this shown, but also in such examples as the plaster decoration of the new Criminal Courts building, at Franklin and Centre Streets; the beautiful new buildings at Sailors' Snug Harbor; the country house of Mr. Stanley Mortimer, on Staten Island, and the severe but classical interior of the Greenwich Savings Bank, at Sixteenth Street and Sixth Avenue, their achievement in genuine artistic expression is among the most prominent features of the buildings named.

A few particulars in conclusion relating to the history of the previous Fifth Avenue Theatre buildings may not be out of place.

The first of these was Augustin Daly's, in West Twenty-fourth Street, back of the Fifth Avenue Hotel, which theatre was burned on the afternoon of January 1, 1873.

The second was the old "New York Theatre," into which Mr. Daly moved after the disaster in Twenty-fourth Street, and which was situated on Broadway, near Washington Place, opposite the New York Hotel.

The third, "Fifth Avenue" Theatre, played a very important part in the annals of the New York stage for twenty years.

It occupied the site of the present theatre.

Built by Peter Gilsey, it became the property of his heirs, who have ever since controlled the same.

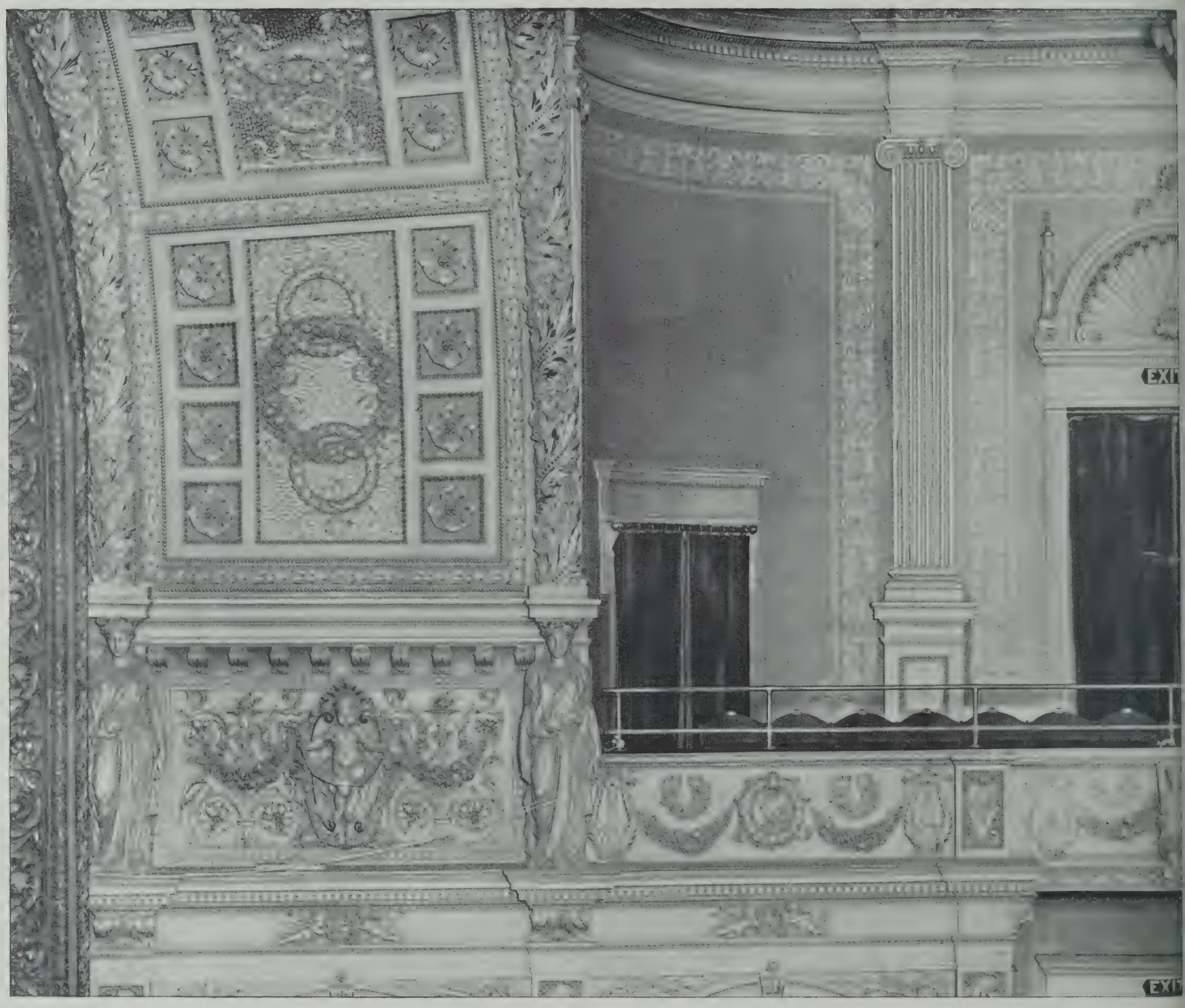
The building had a frontage of 60 feet on Twenty-eighth Street and 65 in the rear, and was 160 feet deep. The vestibule occupied 20 feet, the house 70, the stage 40, and the greenroom 30 feet. The house was 56 feet high, and the stage 62. It was built with division walls of brick, and was fitted with iron doors and shutters. The interior was fitted up with almost regal splendor.

On the evening of January 2, 1891, in less than two hours after the regular performance was over, the theatre was a mass of ruins; nothing was left but the walls.

The disaster was fortunately unaccompanied by loss of life. Fanny Davenport and her company had been patronized by a crowded house, which had dispersed shortly after eleven o'clock. The actors and nearly all the attachés had left the building, when, about 11.45 o'clock, Daniel Finn, the old watchman of the Gilsey Block, in which the theatre is situated, informed Paul Vernon, wardrobe man of the Fanny Davenport Co., that he smelled smoke. Both men began an investigation, resulting in the discovery that the beams in the supers' room in the cellar were ablaze.

The fire spread with amazing swiftness, and the edifice was soon reduced to ruins. Nothing but the bare walls were left.

The illustration offered on another page, of the appearance of the ruins of the old "Fifth Avenue Theatre" after the fire, shows also the old Gilsey homestead, adjoing the theatre property, which was subsequently demolished to afford a lot for the new theatre of 104.9 feet in length by 98.9 feet in width.



THE NEW FIFTH AVENUE THEATRE, NEW YORK.

VIEW SHOWING A SECTION OF THE PROSCENIUM ARCH AND A PORTION OF THE FAMILY CIRCLE.

THE DRAPERIES BY LORD & TAYLOR; THE DECORATIVE WORK BY ARNOLD & LOCKE; THE PLASTER WORK BY J. & J. MORRISON; THE CABINET WORK BY H. MANDEVILLE & SON.

French ingenuity has contrived an improved stone-cutting saw of remarkable efficiency—a circular saw having its edge set with black diamonds in the same way as the straight blades; but as the strain on the diamond is all in one direction, the setting can be made much firmer.

White in House Painting.

Say what you will, my friend, in derision of the white house, it is to me the prettiest, newest and cleanest house ever painted, says V. P. Grinnell, in *House Painting.* Though it may be the subject of your sneers, philosophers, poets, sages and artists have dwelt quite content in the cottage painted white. See the white house in a distance, a bright gem among the trees in the valley, or standing like an emblem of purity on the hillside, making the leaves seem greener and the flowers look brighter by contrast. Look at the white house again in contrast with yonder glowing sunset, with all the glowing colors of forest, field and sky. Neither suffer by contrast. The red and gold of sky and all the tints of field and forest look warmer, softer and purer as seen in contrast with the cottage robed in white.

As the sun goes further down and the bright colors fade to sombre grays, in clouds with silver edges, and "darkening shadows lie along the fields," the white cottage still stands in harmony with the scene.

White is a generous helper; all colors are made brighter by its presence. How it brightens the glow of the reds and deepens and intensifies the blacks! All colors and tints are enlivened by it. Then why, as in modern style, should we leave it out of every scheme of exterior decoration? Here in a white cottage is a bay window with foliage and flowers. How they glow in contrast with the surroundings! How bright and pure the white stands out in contrast with the flowers and foliage. There is no inharmony here among all these colors. Now stand here and look at a similar window in yonder cottage painted in colors. How the colors suffer by contrast with Nature's handiwork; they become dull and gross in presence of the bright flowers and verdant foliage! Not so with white: every brilliant flower and every beautiful and wonderfully colored leaf of the foliage plant make it stand out clearer and brighter. Then why banish white? While your colors are fading, thereby losing their beauty, white is growing whiter and brighter. While the bright green of the leaves and grass gives your olives a bilious tinge, white is made purer and brighter. While the bright flowers by contrast turn your reds a dirty brown, white is improved by their presence.

Ontario Metallic Paint.

The superiority of oxide of iron paint for very many uses is incontestable, as is also its especial fitness for painting iron work, cottages by the sea shore, barns, fences, etc. It is likewise eminently adapted for painting vats and cisterns, canvas coverings, mills, grain elevators, shingle and other roofs, and when mixed with boiled oil in paste makes an excellent cement for stopping cracks in roofs and around chimneys. The Ontario metallic paint in made only in red, all ore used in its manufacture being taken from the mines of the company and reduced to an impalpable powder by improved machinery. It contains 65 per cent. of metallic iron, is free from sulphur or other injurious matter, is ground very fine, and has an excellent body, combining great durability with permanency of color. It is also well adapted for use in coloring clay for brick makers, mortar for masons, and any kind of work where a rich and permanent red is desired. The Ontario Metallic Paint Co., of Rochester, N. Y., are the miners and manufacturers of this paint.

Deadening Floors.

Instead of loading the floor with plaster for the purpose of deadening sound, a method suggested by a writer in one of the French trade papers is to fill in the space between the boarding and the plastering of the ceiling with shavings, which have first been rendered incombustible by dipping them in a tub of thick whitewash. It is a well known fact that soft substances in closing air spaces form a good non-conductor of sound, and the writer in the paper referred to is of the opinion that shavings so treated will be found of great service, while their incombustibility adds in no small degree to the fire-resisting properties of the building. When it is desired to disinfect the space between the floor and the ceiling the shavings are saturated with chloride of zinc, or the latter may be added to the lime wash.

Tropical Roofs.

The natives of the interior of Ceylon finish walls and roofs with a paste of slaked lime, gluten and alum, which glazes and is so durable that specimens three centuries old are now to be seen. On the Malabar coast the flat bamboo roofs are covered with a mixture of cow-dung, straw and clay. This is a poor conductor of heat, and not only withstands the heavy rains to a remarkable degree, but keeps the hut cool in hot weather. In Sumatra the native women braid a coarse cloth of palm leaves for the edge and top of the roofs. Many of the old Buddhist temples in India and Ceylon had roofs made out of cut stone blocks, hewed timber, and split bamboo poles. Uneven planks, cut from old and dead palm trees—seldom from living young trees—are much used in the Celebes and Philippines. Sharks' skins form the roofs of fishermen in the Andaman Islands. The Malays of Malacca, Sumatra, and Java have a roofing of attaps, pieces of palm leaf wicker work, about three feet by two in size, and an inch thick, which are laid like shingles and are practically waterproof. The Arabs of the East Indies make a durable roof paint of slaked lime, blood, and cement. Europeans sometimes use old sails—made proof against water, mould, and insects by paraffine and corrosive sublimate—for temporary roofs.

Purification of Air.

In a paper on the purification of the air supply in public buildings and dwellings, read before the Society of Arts by Mr. Wm. Key, an apparatus was described for filtering and washing the air. It consists of a screen formed by stretching some thousands of cords, of suitable material, from the ceiling to the floor of the air chamber. The cords touch each other and are interlaced horizontally with copper wires, which are drawn tight to give the screen a flat surface, so that it has the appearance of coarse cloth. Air passing through is broken up into minute streams, and is washed free from impurities by water trickling down the cords. Experiments showed that not a particle of the densest fog passed through the screen, the air being filtered "bright and clear, perfectly sweet, and free from odor." Dust particles were not so perfectly removed, but it was noticed that, after removal of fog, the air was so much brighter and clearer than usual as to suggest that the artificial production of fog might ensure the complete removal of very minute dust particles.



THE OLD FIFTH AVENUE THEATRE, BURNED IN 1891.

AN Illinois farmer, in a communication to the *Rural New Yorker*, says the wearing value of woods in his section for weather-boarding is in the following order: Yellow poplar, black walnut, white pine, sweet gum, hemlock, spruce, and tamarack. This may not be in accordance with the opinions of some lumbermen, but is given by the writer as the result of practical experience. Fence-post timber he rates as follows, with reference to lasting qualities: Red cedar, mulberry, osage orange, white cedar, black locust, white oak, jack oak, black walnut, ash, hackberry.

Seasoning Stone.

The thorough drying of a stone before, and the preservation of this dryness after, its insertion in masonry are commonly recognized as important factors of its durability; but the exact nature of the process of seasoning and of the composition of the quarry-sap removed by thorough drying have never been determined. The quarry water may contain little else than ordinary well water, or may be a solution more or less nearly saturated, at the ordinary temperature, with carbonate of calcium, silica, double salts of calcium and magnesium, etc. In the latter case, hardening results from the drying, and an exact knowledge of its nature might throw important light on the best means for the artificial preservation of stone. Again, water may exist in large quantity, in chemical combination, in the silicates (*e.g.* chlorite, kaolin, etc.) or in the hydrated iron oxides which constitute the cement of a building stone.

Stone Under the Microscope.

It is often held that the best method of determining the probable durability of a building stone is to study its surface, or thin, transparent slices, under a microscope. This method of study in recent years has been most fruitful in developing interesting and valuable knowledge of a scientific and truly practical character. An examination of a section by means of the microscope will show not merely the various substances which compose it, but also the method according to which they are arranged, and by which they are attached to one another. For example, pyrites is considered to be the enemy of the quarryman and constructor, since it decomposes with ease, and stains and discolors the rock. Pyrites in sharp, well-defined crystals sometimes decomposes with great difficulty. If a crystal or grain of pyrites is embedded in soft, porous, light-colored sandstones, its presence will certainly soon demonstrate itself by the black spot which will form about it in the porous stone, and will permanently disfigure and mar its beauty. If the same grain of pyrites is situated in or near very hard, compact, non-absorbent stone, the constituent minerals of which are not rifted or cracked, this grain of pyrites may decompose and the products be washed away, leaving the stone untarnished.

Housekeepers Should Remember.

Katharine B. Johnson gives in the Albany *Cultivator* some household hints that are very seasonable.

That there are few servants so thorough that they should not inspect the refrigerator daily to see that no liquids are spilled or food allowed to spoil and contaminate the rest.

That dish water, which is always impregnated with more or less vegetable matter, should never be thrown on the surface of the ground at the back door.

That all tubs and basins in bathrooms and kitchen sinks and drains should be flushed with hot water on every weekly washing day.

That sulphate of iron (copperas) and chloride of lime, two of the best disinfectants, are but ten cents a pound, and a plentiful use of either in sinks and open drains during the summer and autumn may prevent that dreaded disease, typhoid fever.

That no hamper or other receptacle of soiled clothing, no matter how handsomely decorated, should be kept in a sleeping apartment.

That powdered borax, plentifully used, will exterminate cockroaches and water bugs.

THE government has recently let the contract for the Cavalry Stables at Ft. Leavenworth, Kansas. There are to be two fine large brick buildings, arranged for 144 horses, which are to be fitted throughout with the most improved stable fixtures, such as hay racks, oat mangers, saddle and bridle brackets, harness hooks, etc. Seventy-two ventilators will be placed in the stables, and each of the 76 windows will be covered with a galvanized wire window guard. The old established house of E. T. Barnum, manufacturer of wire and iron work, Detroit, Mich., has secured the contract. The firm will send one of its catalogues to any one in need of anything in the wire and iron line.

ONE of the most troublesome pests that inflict housekeepers are the red ants. And when they once get into a house they are very difficult to dislodge. The writer had a trying experience with them for a long time. Every effort to get rid of them was without avail. In his dire extremity he applied to Sallade & Co., 53 West Twenty-fourth St., N. Y., for relief. The result was the Sallade Company, with their insect exterminator, accomplished their work most satisfactorily, and the house is free of ants.

THE Croton aqueduct in New York surpasses all modern engineering efforts of this kind.

A TUNNEL under the Thames was proposed in 1799; the first tunnel was finished in 1843.



AN ENGLISH VILLA.—See page 33.



AN ITALIAN COURT YARD.—See page 33.

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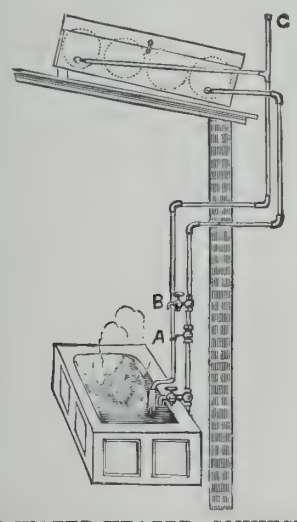
THE CLIMAX SOLAR WATER HEATER.

This is an apparatus for heating water for household use by the heat of the sun, and it is said to work so successfully in practice that the water is sometimes made almost boiling hot, obviating, in many cases, the necessity of keeping a fire in the house in the summer time. The heater, which is placed on the roof, or may be supported on a bracket on the sunny side of the house, comprises a white pine box, made very close and tight, lined



SOLAR WATER HEATER—ROOF TANKS.

with felt paper, and covered with a glass sash; in the box are four galvanized iron cylindrical tanks, each holding about eight gallons, the tanks being painted a dull black, which quickly absorbs the heat of the sun. The tanks are so connected as to keep the in-going cold water from mixing with the hot water, the feed being at the front end of the lowest tank, while the hot water supply is



SOLAR WATER HEATER—CONNECTIONS.

drawn from the top of the fourth tank. The cold water is let on at the faucet A, B being a drain cock to let off the water to prevent freezing, and C an air opening to prevent vacuum in the heater and siphonic action. The pipe connections may be made through the roof or the side wall. This apparatus is manufactured by Clarence M. Kemp, Baltimore, Md.

Roofs and Roof Coverings.

In actual execution, the roof, of course, precedes the roof covering; but in working out a design it is frequently the covering which decides the shape of the roof. When once settled, it fixes at least the lower limit for the pitch, and it may even have an influence on the question of hips or gables. In olden times this influence was marked. In many districts hip tiles were scarcely to be had; lead hips were too costly for common use, and hips made up with slates and mortar were both unsightly and insecure. This difficulty has long since vanished. Facilities for transit are, from one point of view, even too great. Materials can be so readily taken from place to place that local peculiarities in building are tending to die out. The country, and one might almost say the world, is getting too much alike all over it, and amongst other things we now find tile hips and ridges everywhere. They have, however, usefulness at least to recommend them. They supply a practical want; but this is more than can be said of all the materials which are nowadays becoming fashionable in localities to which they do not belong. Traveling has become easy; but when all places become pretty much alike, what will there be to travel for? It is time that all architects set themselves, as some have long done, to fight against this impending uniformity, and it is worth noting how many roofing materials, and how many ways of using those materials, may still be found within the boundaries of England alone.—*Manufacturer and Builder.*

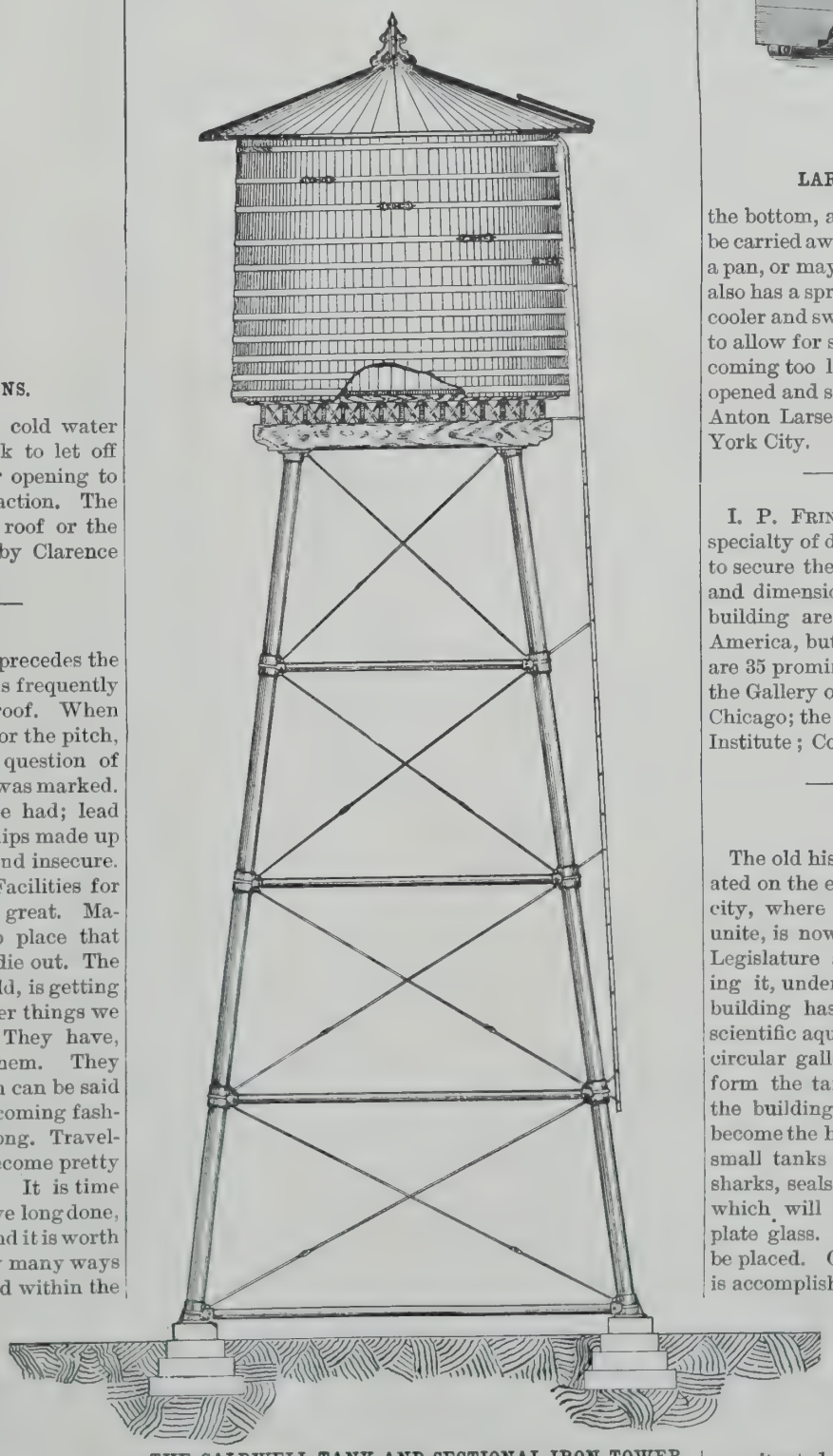
LITHARGE CEMENT.—Litharge, mixed with glycerine to the consistency of putty, will stop cracks in iron kettles, mend stone jars, tighten loose joints of iron or wood, fasten lamp tops to their standards, and is good to rub in the seams of old milk pans. It hardens in a few hours, and is perfectly harmless. It will resist acids, heat and cold.

THE ARCHITECTURAL SHEET METAL WORK shown in the 1893 catalogue of W. H. Mullins, of Salem, Ohio, embraces a great variety of galvanized iron and copper cornices, complete building fronts, steel and galvanized iron ceilings, stamped zinc ceiling centrepieces, metal roofing, copper, brass, or wrought iron office railings and fixtures, etc. Although the catalogue shows a large stock from which builders may select, new designs are being constantly gotten out, and artistic work of a very high character has been produced at this establishment. Architects, builders and contractors can here obtain sheet metal work suitable for almost every style of building, which is shipped in sections ready to put up, with but the slightest necessity for skilled labor.

THE J. H. & D. Lake Co., manufacturers of all kinds of Friction Clutch Pulleys, having outgrown their old quarters at Hornellsville, N. Y., have recently completed and removed to handsome new offices and foundry at Massillon, O., where with enlarged facilities they are prepared to meet the growing demand of their business.

TOWER SUPPORTED TANKS.

The sectional iron tower shown in the illustration, and the cypress wood tank supported thereon, represent a kind of work of which Messrs. W. E. Caldwell Co., of Louisville, Ky., are large manufacturers, having had sixteen years' experience in this line. They make tanks of all sizes, the capacity of which ranges from 300 to 100,000 gallons, and know the need of a careful selection of material, perfect joints and close fitting where the bottom enters the croze, or recess in the stave, as well as the proper size and strength of hoops, and have a factory equipped with the latest improved machinery for the production of such work. The Southern cypress they use is indisputably superior in lasting qualities over other classes of wood. The style of tower shown is extensively used in connection with automatic sprinkler outfits, also for independent water supplies for small

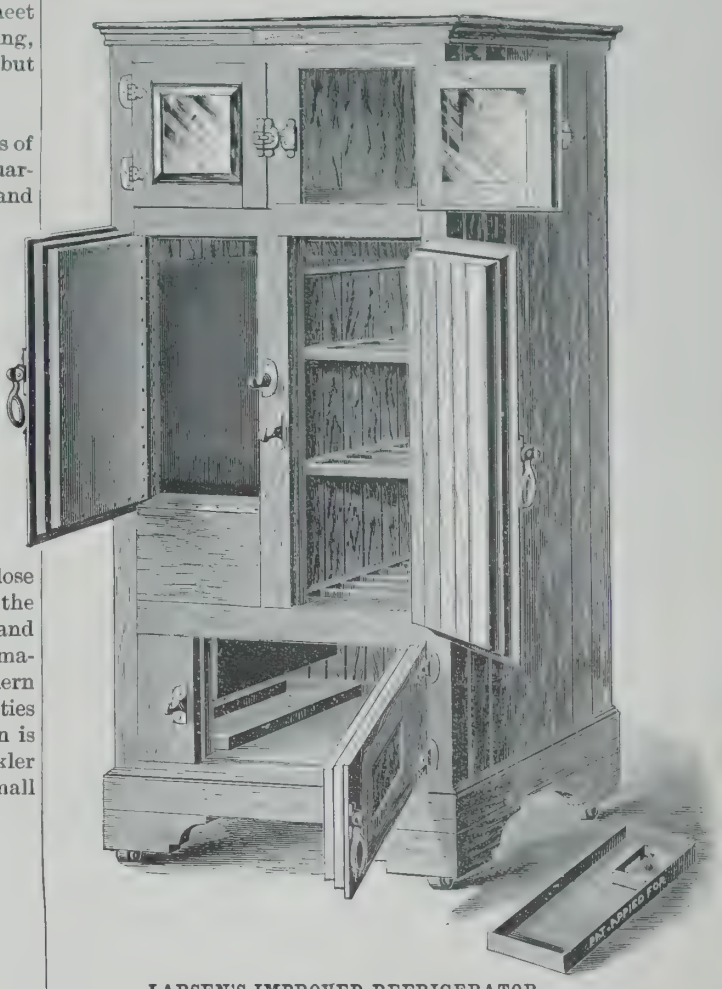


THE CALDWELL TANK AND SECTIONAL IRON TOWER.

places, and for a protection for mills, factories, etc., against fire. The cost of such towers is very moderate, considering their strength and durability.

LARSEN'S IMPROVED REFRIGERATOR.

The refrigerator shown in the illustration is designed to cause a continuous flow of air in one direction. It is centrally divided by a partition, at one side of which is the ice box, the cold air normally descending and thence rising in the other side, as the air has been withdrawn therefrom to take the place of the air drawn downward in the ice chamber. By this means the refrigerator is designed to be thoroughly cooled in all its parts, at the top as well as at



LARSEN'S IMPROVED REFRIGERATOR.

the bottom, all impurities being deposited upon the ice to be carried away with the waste water, which is received by a pan, or may be siphoned off by a trap. This refrigerator also has a spruce board lining, designed to keep its contents cooler and sweeter, and the doors are flanged sufficiently to allow for some shrinking or swelling without their becoming too loose or so tight that they cannot be easily opened and shut. It is made of hardwood, in all sizes, by Anton Larsen, Nos. 413 and 415 East 124th Street, New York City.

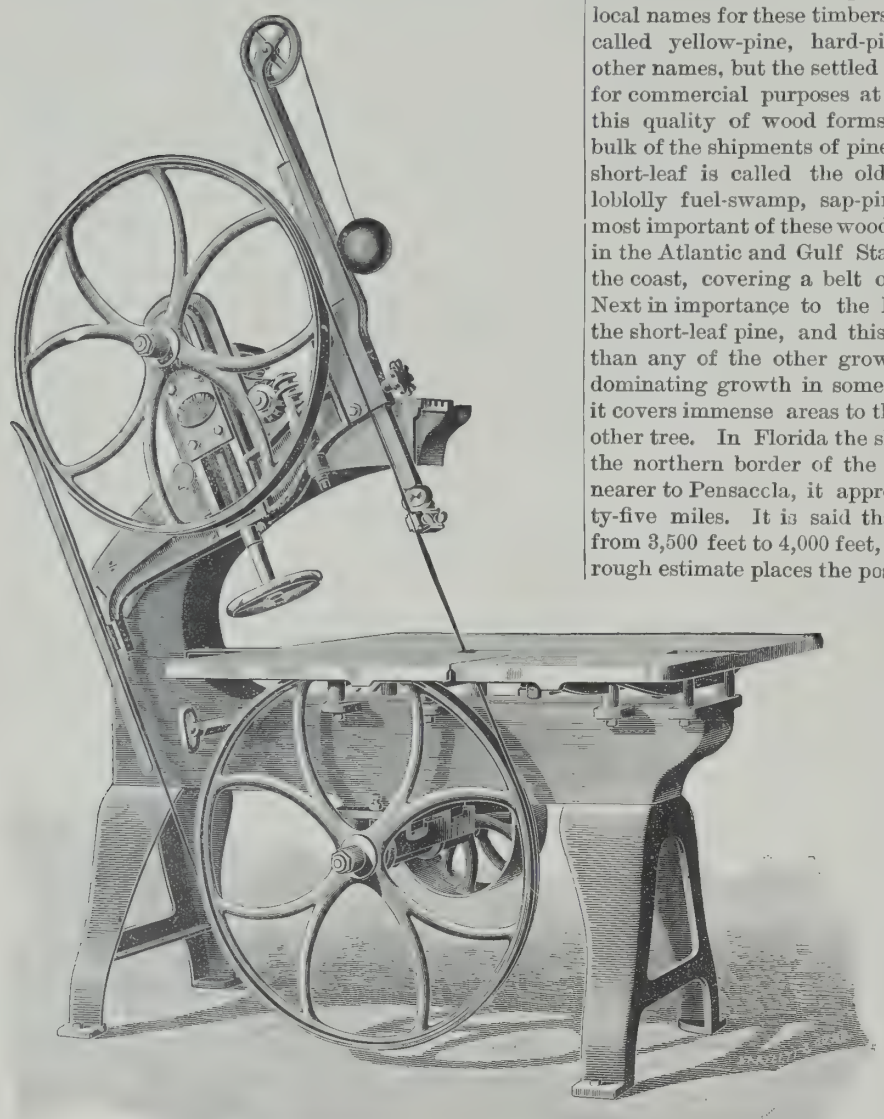
I. P. FRINK, 551 Pearl Street, New York, makes a specialty of designing electric and other reflectors to order, to secure the best distribution of light when the purposes and dimensions of a hall, church, theatre, or other large building are given. These reflectors are sold not only in America, but abroad. Among recent buildings supplied are 35 prominent churches in various parts of the country; the Gallery of Fine Arts, World's Columbian Exposition, Chicago; the State House, Columbus, Ohio; Chicago Art Institute; Convention Hall, Saratoga.

The New York Aquarium.

The old historic fortress known as Castle Garden, situated on the extreme point of land at the south end of the city, where the waters of the Hudson and East Rivers unite, is now transformed into a free aquarium. The Legislature appropriated $150,000 to pay for converting it, under the charge of the Park Department. The building has been remodeled by Mr. H. T. Woodman, a scientific aquarist. Round the walls and beneath a light circular gallery are two ranges of brick cells, which will form the tanks, and beneath the dome, in the centre of the building, is a large central tank, which will, in time, become the home of a white whale or grampus; and six small tanks around the centre tanks will be used for sharks, seals, etc. There are thirty-six side tanks in all, which will be lined with white tiles and faced with plate glass. In the gallery eighty-four small tanks will be placed. Great care is taken with the lighting, which is accomplished by means of skylights. Special tanks are provided for the blind fishes, and experiments will be carried on to see if the blind fishes will not, on favorable conditions, recover their sight. Abundant supplies of fresh and filtered salt water will be provided. The three great aquariums of the world are situated at Naples, Brighton and Berlin. The present aquarium is much better equipped than the Berlin aquarium, and will doubtless in time rival the other two great aquariums. It is a valuable acquisition to the city.

ADJUSTABLE BEVEL-BAND SAW MACHINE.

The cut represents a right-handed machine, designed to avoid the difficulties encountered in holding and guiding work on inclined tables. It has a tubular or hollow body, combining great strength with moderate weight. The wheels are covered with rubber, vulcanized upon them, and not liable to come off, as it is when cemented on. The upper wheel can be angled while in motion, and from the front of the machine. The tension of the saw is maintained by a rubber spring, which is superior to a weight in its ability to yield instantly when a chip gets between saw and wheel, and in not needing separate adjustments. Whenever any change of saw is made, one and the same movement adjusts the upper wheel to length of saw, and produces any degree of tension required. The loose pulleys are self-oiling. The machine is provided with a Non-friction Band Saw Guide, which has proved a great success. The saw can be inclined from 0 to 45 degrees by turning a single hand-wheel, it being unnecessary even to clamp the parts in place, as all remain locked in any position. When a varying bevel is desired, as for shipwork, it can be produced by turning the handwheel while the work is being fed to the saw. The table is of iron. When used for heavy work, such as ship timbers, the table is provided with rollers. Diameter of wheels, 40 in. Height of sawing space, 16 in. Total height, 8 ft. 6 in.; width, when set at 45 degrees, 8 ft. 9 in.; depth, 4 ft. Loose and tight pulleys, 16 in. in diameter for a 4 in. belt. Weight, about 2,000 pounds. Several of these machines are in use by the United States Government. For further information address the manufacturer, P. Pryibil, 507–519 West Forty-first Street, New York City.



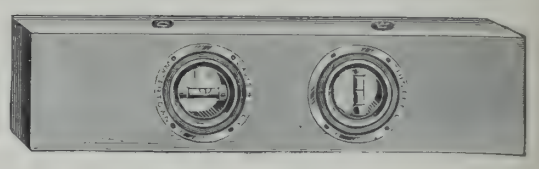
IMPROVED BEVEL-BAND SAW MACHINE.

United States Pitch-Pine Industry.

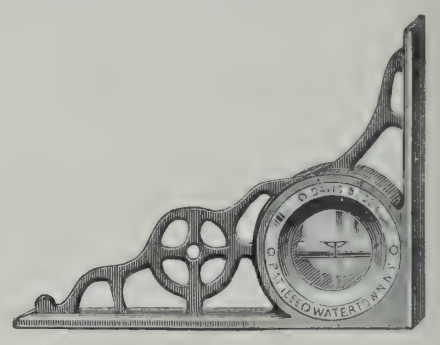
The British vice-consul at Pensacola says that the immense quantities of pitch-pine wood, hewn, sawn and manufactured, which have been shipped from the United States—notably to the United Kingdom—for so many years past, and which are still being shipped without any diminution, leave it apparent that information on this subject generally, and particularly on the probable length of time that these pitch-pine forests will hold out, will be of value and interest to the principal dealers in this great article of trade. The pitch-pine trees of the Southern States are of spontaneous growth, and especially indigenous to those sandy soils near to the water of the Gulf and Atlantic coasts, and therefore hardly any attention is given to the culture of these trees. It is believed that the pine-wood of the Southern States is coming more and more to the front, and that it is the most valuable wood of the country for mercantile purposes, and that, as the white wood of the Western and Eastern States becomes exhausted, the Southern States will be more relied upon. It is stated by the Forestry Bureau of the Department of Agriculture in the United States that there are about ten species of merchantable pine in the Southern States: the white pine and pitch-pine, the scrub or spruce-pine, the sand-pine, the pond-pine, the cedar-pine and the long-leaf, short-leaf, loblolly and Cuban pines, which are the principal varieties in general use. There is a great deal of confusion arising from the indiscriminate use of local names for these timbers. Thus, the long-leaf pine is called yellow-pine, hard-pine, pitch-pine and various other names, but the settled name of this species of wood for commercial purposes at Pensacola is pitch-pine, and this quality of wood forms the largest if not the entire bulk of the shipments of pine-wood from Pensacola. The short-leaf is called the old-field and spruce-pine, the loblolly fuel-swamp, sap-pine and Virginia pine. The most important of these woods—the long-leaf pine—grows in the Atlantic and Gulf States, at some distance from the coast, covering a belt of about 125 miles in width. Next in importance to the long-leaf pine—pitch-pine—is the short-leaf pine, and this is more widely distributed than any of the other growths of pine. It is the predominating growth in some of the Southern States, and it covers immense areas to the exclusion of almost every other tree. In Florida the short-leaf pine is found along the northern border of the State. In Western Florida, nearer to Pensacola, it approaches the Gulf within twenty-five miles. It is said that the short-leaf pine gives from 3,500 feet to 4,000 feet, board measure, per acre. A rough estimate places the possible standing timber of this species, distributed throughout the Southern States, about 160,000,000,000 feet, board measure. The loblolly pine is found only in the northern part of Florida, and the Cuban pine is found principally in Florida and along the Gulf coast. It grows mainly on the so-called pine flats or pine meadows. About twelve years ago the official estimates of the merchantable pine timber standing in the Southern States gave a probable quantity of 225,000,000,000 feet. Since that time there has been an enormous quantity of timber cut, but the amount standing now is estimated as follows: Long-leaf and Cuban pine, 232,000,000,000 feet; short-leaf pine, 160,000,000,000; and loblolly pine, 102,000,000,000 feet, making a total of 494,000,000,000 feet, board measure. The long-leaf pine is known to be superior to all the other species in strength and durability. In tensile strength it is said to approach, and perhaps surpass, cast iron. In cross-breaking strength it rivals the oak, requiring, it is stated, 10,000 lb. pressure per square inch to break it. In stiffness, it is superior to oak, by from 50 to 100 per cent. It is best adapted, and much used, for the construction of heavy work in shipbuilding; the inside and outside planking of vessels taking the deals and planks of the best quality. For house building it is used almost entirely in the district of Pensacola, and in buildings for railroads, railroad cross-ties, viaducts and trestles, this wood is foremost. The finer grades and the "curly" woods are very much used for the timber work in the best dwellings. The hardness of this wood especially fits it for planks and flooring. The finer grades of curly-pine are used for the manufacture of furniture, and it is said that for bedsteads it is admirably adapted, as the resinous wood prevents the inroads of insects and similar pests. The resinous products of pine-wood supply many parts of the world with pitch, resin and turpentine. And, contrary to opinion formerly held in this respect, it is said that the tapping of the pine tree for turpentine strengthens, instead of weakens, the wood. The Cuban pine is like the long-leaf pine, and is used in trade to a large extent. The short-leaf pine is a softer wood, and is more easily worked. This wood is admirable for house work, and is largely used by builders and cabinet-makers, and for other purposes. The loblolly pine is suited for rougher work than the other two species, but it is not so strong, and it will not last so long as the others. It is stated, in a recent report of the United States Department of Agriculture, that in respect of the pine forests of the Southern States, the supply is good for fifty years to come.

THE COOK PATENT LEVELS.

These levels, besides being well made and tested before leaving the factory, differ in important particulars from the ordinary level. The bulb tube is set in a frame faced

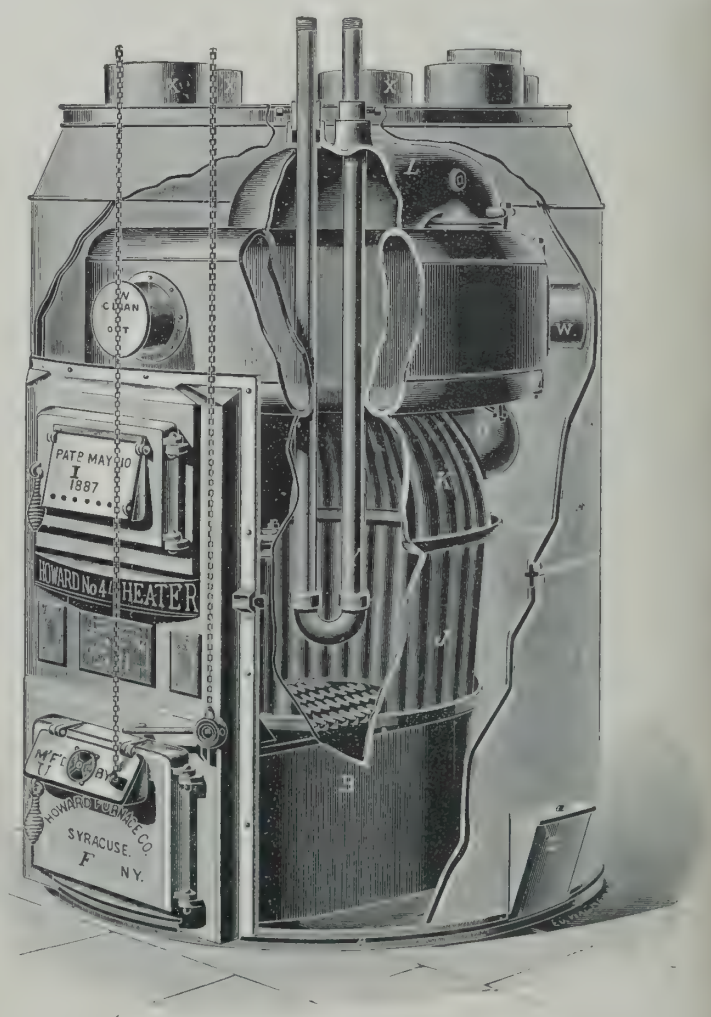


with glass, so that it may be seen from either side and can be used under as well as over the thing to be leveled, or in other positions not possible with the ordinary level. It also has two bulbs, one for leveling and one for plumbing. The iron plumb, level and square shown is of a light and attractive pattern, with highly finished edges. These levels are manufactured by Messrs. Davis & Cook, Watertown, N. Y.



THE HOWARD COMBINATION HEATERS.

The system of combining hot water and warm air heating, which has rapidly gained in favor within a very recent period, is well represented in the furnaces built by the Howard Furnace Co., of Syracuse, N. Y., in which the warm air is utilized the same as in a warm air furnace alone, while the hot water is also made to do very effective work, the heating being thus rendered very economical, and the furnace requiring no more care than an ordinary warm air furnace. The accompanying illustration represents a single radiator warm air and hot water heater made by this company, in which the warm air furnace is provided with a specially constructed adjustable pipe boiler, both main supply and return pipes of which enter the heater at the top, or through the smoke-flue section. The pipes pass through stuffing boxes, which permit of their being adjusted in any desired position by set-screws, without disturbing the furnace in any way. The system is very simple in its working, and, sufficient water having been once supplied, it requires no further attention, there being no loss of water from circulation.



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A COTTAGE AT WAYNE, PA.





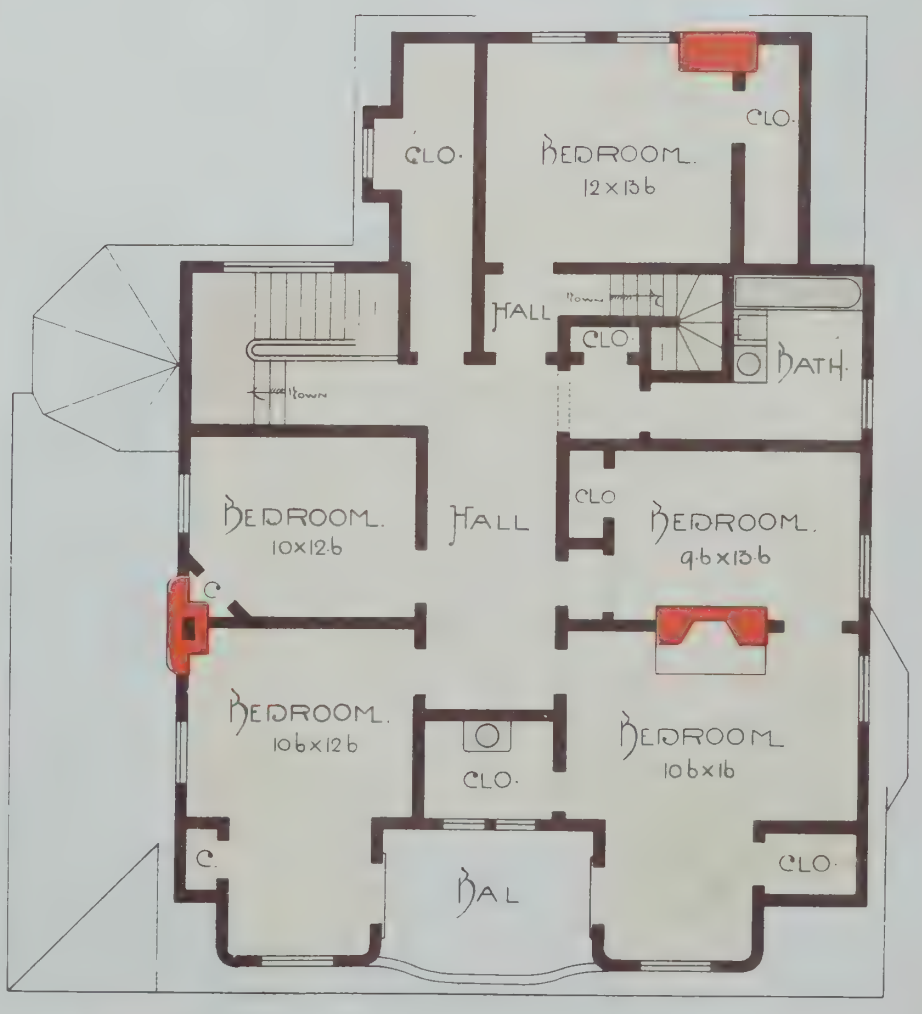
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A COTTAGE AT BRIDGEPORT, CONN.



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A COTTAGE AT BRIDGEPORT, CONN.—See page 46.

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O. D. MUNN. A. E. BEACH.

NEW YORK, OCTOBER, 1893.

THE

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A COTTAGE AT BRIDGEPORT, CONN.

One of our colored plates in this issue illustrates a residence recently erected for Friend W. Smith, Esq., at Bridgeport, Conn. An additional view will be found on page 45 also. The design is treated in the Colonial style, and it has a well-shaded piazza, porch, balcony, bay windows, and a "Dutch" chimney, a feature in itself. The underpinning is built of local brick, laid up in red mortar. The first story is clapboarded and painted dark olive green, with bottle green trimmings; the second and third stories are covered with shingles and painted light drab, with similar trimmings. Roof shingled and stained a "moss" green. Dimensions: Front, 46 ft. 6 in.; side, 43 ft. 6 in., not including front piazza. Height of ceilings: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft. 6 in. The interior arrangement is excellent. The plans show many large rooms. The first floor is handsomely trimmed with cherry and finished natural. The hall has a paneled wainscoting and a hardwood cornice. The front doors are glazed with beveled plate glass. The staircase is an ornamental one, turned out of cherry, with a carved newel. This staircase is lighted by a window, glazed with delicately tinted glass, shedding a pleasant light over upper and lower halls. Reception room is spacious and well lighted. Library contains an open fireplace, built of brick and furnished with tiled hearth and facings, and a cherry mantel with mirrors, etc. Dining-room is trimmed with ash. It has a paneled wainscoting, hardwood cornice, and a fireplace built of pressed brick and terra-cotta, and provided with a shelf of similar wood. Den has a paneled wainscoting and divan. The ceiling is ceiled with narrow beaded stuff. The floors are laid with oak in narrow swaths, and highly polished. Kitchen, rear hall, and pantries are trimmed and wainscoted with whitewood, and are fitted up with the usual fixtures complete. The second floor is trimmed with whitewood and finished natural, with the exception of front bedroom, which is stained and finished in ebony. This floor contains five bedrooms, large closets and bathroom, the latter being wainscoted and fitted up complete. Third floor contains ample room for storage, etc. Cemented cellar contains laundry, furnace, and other necessary apartments. Mr. Warren R. Briggs, architect, Bridgeport, Conn.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A COTTAGE AT WAYNE, PA.

We publish as the subject of one of our colored plates in this issue a dwelling, a very odd and tasty bit of rural architecture, erected for George W. Childs, Esq., at Wayne, Pa. We also give an additional view on page 47. The design is thoroughly Queen Anne in its treatment, and the elevations present a picturesque appearance of unusual beauty. There is a wide porch at the front entrance, extending along the side of the house, a tower at second story, turret containing rear stairway, and open grates in reception-hall and drawing-room. The underpinning and first story is built of rock-faced Chestnut Hill granite, laid up at random, and, by pebble-dashing part of second story and painting it Colonial yellow, a quaint and artistic effect is obtained; the remainder of the exterior walls being covered with shingles and stained a dark mahogany color. Roof shingled and stained similar. Dimensions: Front, 38 ft. 6 in.; side, 58 ft. 6 in., exclusive of front piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The interior is finished in a very handsome manner. Lobby has a hardwood floor and a paneled wainscoting and ceiling beams. Reception hall is trimmed with oak, and it has a fireplace built of brick and terra-cotta, with hearth of same and a hardwood mantel shelf. This hall is separated from staircase hall by an arch provided with a spindle transom. Staircase is provided with a massive carved newel with candelabrum, and is lighted by double stained glass windows. Drawing-room is treated in ivory white and gold. It has a fireplace trimmed with tiles and furnished with a mantel of exquisite design, with beveled plate mirrors, etc. Dining room, trimmed with oak, is provided with a buffet built in and carved in an elegant manner. Butler's pantry, kitchen and laundry are trimmed and wainscoted with whitewood finished natural, and furnished with the usual fixtures complete. Second floor trimmed with whitewood, and contains five bedrooms, large closets and bathroom, the latter wainscoted and fitted up replete. Third floor contains three bedrooms, trunk room and storage. Cemented cellar contains furnace and other apartments. Cost, $6,700, complete. Messrs. F. L. and W. L. Price, architects, 731 Walnut Street, Philadelphia, Pa.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT HOLYOKE, MASS.

We publish on page 48 a residence erected for F. D. White, Esq., at Holyoke, Mass. The building is of large proportions, and is well ornamented on the exterior by many bay windows, tower, chimney, piazza, and porch. The interior contains fourteen large rooms. The underpinning is built of brick. The first story is clapboarded, and painted light brown with darker trimmings; second story is shingled, and painted Colonial yellow; roof shingled, and painted red. Dimensions: Front, 42 ft.; side, 51 ft., exclusive of front piazza Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. Lobby is trimmed with oak, and is provided with a tiled floor. Hall is trimmed with similar oak, and it contains an ornamental staircase lighted by stained glass windows. Toilet is located conveniently. Parlors are trimmed with sycamore. The fireplace is trimmed with tiles and provided with a hardwood mantel. Library is trimmed with whitewood, finished natural, and dining-room is trimmed with antique oak. Butler's pantry, kitchen and rear hall are trimmed with North Carolina pine. These apartments are wainscoted, and provided with the usual fixtures complete. The second floor is trimmed with whitewood, and it contains six bedrooms, seven closets, and bathroom, the latter wainscoted and fitted up replete. Third floor contains three bedrooms and ample storage. Cemented cellar contains laundry, furnace, and other necessary apartments. Cost $6,900, complete. Mr. B. P. Alderman, architect, Holyoke, Mass.

Our engraving was made direct from photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A DWELLING AT NEW HAVEN, CONN.

We present on page 53 a residence erected for C. W. Gould, Esq., at New Haven, Conn. The design is admirable for a suburban cottage, both in arrangement and appearance, and it has fine, large rooms, a well lighted hall and stairway, good closet room, cellar, and a very comfortable and attractive veranda. The underpinning is built of brick, and the building above is covered on the exterior with clapboards and shingles, and is painted light brown with darker trimmings. Roof shingled and painted red. Dimensions: Front, 28 ft.; side, 35 ft. 6 in., not including front piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. Hall, parlor and dining-room are trimmed with ash and finished natural. Parlor has a neat wood mantel. Dining-room is provided with a large butler's closet, fitted up in a first-class manner. This pantry and kitchen are trimmed and wainscoted with North Carolina pine. The floors in front hall, kitchen and pantry are laid of hardwood. The front door is of ash, and is glazed with beveled plate glass. The other doors have white pine frames and whitewood panels. The rear porch contains an ice box built in closet. The second floor is trimmed with whitewood, finished natural, and it contains three bedrooms, bathroom and alcove. Bathroom is wainscoted and finished replete. There are no rooms on third floor, but three bedrooms could be finished off, if desired. Cemented cellar contains furnace, laundry, and other necessary apartments. Cost $2,854 complete. Messrs. Wilson & Brown, architects, New Haven, Conn.

Our engravings were made direct from photographs of the building taken specially for the SCIENTIFIC AMERICAN.

RESIDENCE OF W. R. MYGATT, ESQ., DENVER, COLO.

This elegant residence, illustrated on page 50, is built of blue sandstone from the Longmont, Colo, quarries. Slate roof, hardwood finish, mahogany, oak, sycamore and ash. Richardson & Boynton hot water heater, same being placed in basement of coach house adjoining. Bathroom has tiled floor and is wainscoted, porcelain tub and most approved plumbing. Wall handsomely frescoed. Cost, $28,000. Lang & Pugh, Denver, Colo., architects.

RESIDENCE OF WALTER DUNNING, ESQ., DENVER, COLO.

This beautiful residence we illustrate on page 52. Constructed of select white lava, of which there are large quarries at Larkspur, Colo., not far from Denver. Romanesque style. Cornice and porches of stone. Fifteen rooms, finished in hardwood, oak, red birch, black ash, sycamore. Hall ceiling elaborately paneled with hardwood. Carved oak stair newels, wainscoted with oak. Cost, $26,000. Lang & Pugh, architects, Denver, Colo.

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A COTTAGE AT HARTFORD, CONN.

We present, on page 49, a cottage which has been erected for Miss Esther Perry, at Hartford, Conn. The design is unique and convenient, and it contains nine rooms, den and bathroom. The underpinning is built of local brick, laid up in red mortar. The exterior framework is sheathed, and the first story is clapboarded and painted light olive green with darker trimmings; second story shingled and stained sienna. Roof shingled and painted red. Dimensions: Front, 27 ft. 6 in.; side, 40 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. Hall is trimmed with ash. It contains an ornamental staircase turned out of similar wood. The remainder of the interior is trimmed with whitewood, finished natural. The doors and windows have beaded casings and turned angle blocks. Library has an open fireplace, furnished with tiled trimmings and a hardwood cherry mantel. Dining-room is provided with a china closet, fitted up complete. Kitchen is wainscoted with narrow beaded stuff, and it is provided with a range, sink, pot-closet, large pantry and stairway to cellar and second floor. There are four bedrooms, den and bathroom on second floor, and one bedroom and ample storage on third floor. Bathroom is wainscoted and furnished with the usual fixtures complete. Cemented cellar contains furnace, laundry and other apartments. Mr. Brooks Lincoln, architect, same place.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT CARTHAGE, ILL.

On page 54 we illustrate the residence of W. H. Griffith, Esq., of Carthage Ill. It is a frame dwelling with all the modern improvements. The height of the first floor is 2½ ft. above grade line, and is reached by broad steps leading up to the front veranda, whence a pair of wide doors opens into a vestibule, which opens into a large stair hall. The hall is ample, with library, sitting-room, dining-room, and bedroom, connected by wide sliding doors, so that on occasion these rooms can easily be thrown together. The sitting-room and bedroom are furnished with drawers under the projecting windows. The kitchen is well located. The bathroom is located between bedroom and kitchen, and is well fitted and plumbed. There is a well-fitted pantry between kitchen and dining-room. On the second floor are three large chambers and ample closet accommodations. On the whole, we have a very convenient arrangement of rooms, with a neat and pleasing elevation. Total cost $4,500. Geo. W. Payne, architect, Carthage, Ill.

RESIDENCE OF E. W. SMITH, ESQ., AT BRAZIL, IND.

We illustrate this residence on page 55. The size of structure, 30 ft. front and 55 ft. side, not including veranda; blue limestone for cellar and foundation, laid in cement mortar; stone laid up at random; tucked joints; furnace and coal room, 16 ft. x 16 ft., 8 ft. in clear, with stair from porch with outside door; two chimneys with furnace flue. Exterior of structure: Wall studding 22 ft. and 2 x 4, lined with inch pine boards, and then papered and regular weatherboard, with belt line of red wood shingles concaved, also frieze of same; scroll rafters and roof gutter and down spouts: roof shingled with best cedar shingles and then painted; front veranda shingled, and it supports a part of one upstairs bedroom; size of rooms marked on plans; ceiling all 10 ft. in clear; floor laid out of yellow poplar; attic floored and way from bathroom up; inside finish on first floor in parlor and sitting-room white pine and walnut, five member; the hall and staircase oak; newel post run to ceiling with turned spinel arch at top; library and dining-room finished plain and grained; two mantels, oak and cabinet, tile border and hearth; all the rooms on second story finished in oak, except dressing-room and bath, which are finished in yellow pine; all the doors are chestnut, five panel, 2 x 8 by 8 ft., 1¾ in. thick, all bronze trimmings; bathroom has wash basin and is replete with all modern appliances; hot and cold water; electric bells all through house and wired for electric lights replete; the inside finish is finished in natural wood, with Miller's hard oil finish. The cost of the structure complete was $3,600. E. W. Smith, contractor and builder, Brazil, Ind.

A RESIDENCE AT BRIDGEPORT, CONN.

We present on page 51 two perspective views, showing four elevations and floor plans of a residence recently completed for George Kingston, Esq., at Bridgeport, Conn. The elevations are pleasing and attractive, and the principal features are the piazza, balcony, and tower, while the plans show a convenient interior arrangement, which is finished in a handsome manner, and provided with the usual fixtures complete. The underpinning is built of local rock-faced bluestone. The exterior is clapboarded and shingled, and painted pearl gray with darker trimmings. Roof shingled and painted red. Dimensions: Front, 36 ft. 6 in.; side, 44 ft., not including front piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. Front hall is trimmed with red mahogany. It has a paneled wainscoting and contains an ornamental staircase, with a carved newel and candelabra. This staircase and hall are lighted by stained glass windows. Parlor and library are also trimmed with mahogany, and each have open fireplaces trimmed with tiles and furnished with hardwood mantels made from special designs. Dining-room is trimmed with antique oak and it has a wainscot in panels. It is provided with china-closets, with doors glazed with beveled plate glass. Kitchen and its apartments are trimmed and wainscoted with Georgia pine. The second floor is trimmed with whitewood, finished natural, and it contains three bedrooms, large closets, bathroom and den. Bathroom is wainscoted and provided with the usual fixtures. Three bedrooms on third floor. Cemented cellar, containing laundry, furnace, and other necessary apartments. Cost $5,000 complete. Messrs. Longstaff and Hurd, architects, Bridgeport, Conn.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.



A COTTAGE AT WAYNE, PA.—See page 46.

Imitation Walnut.

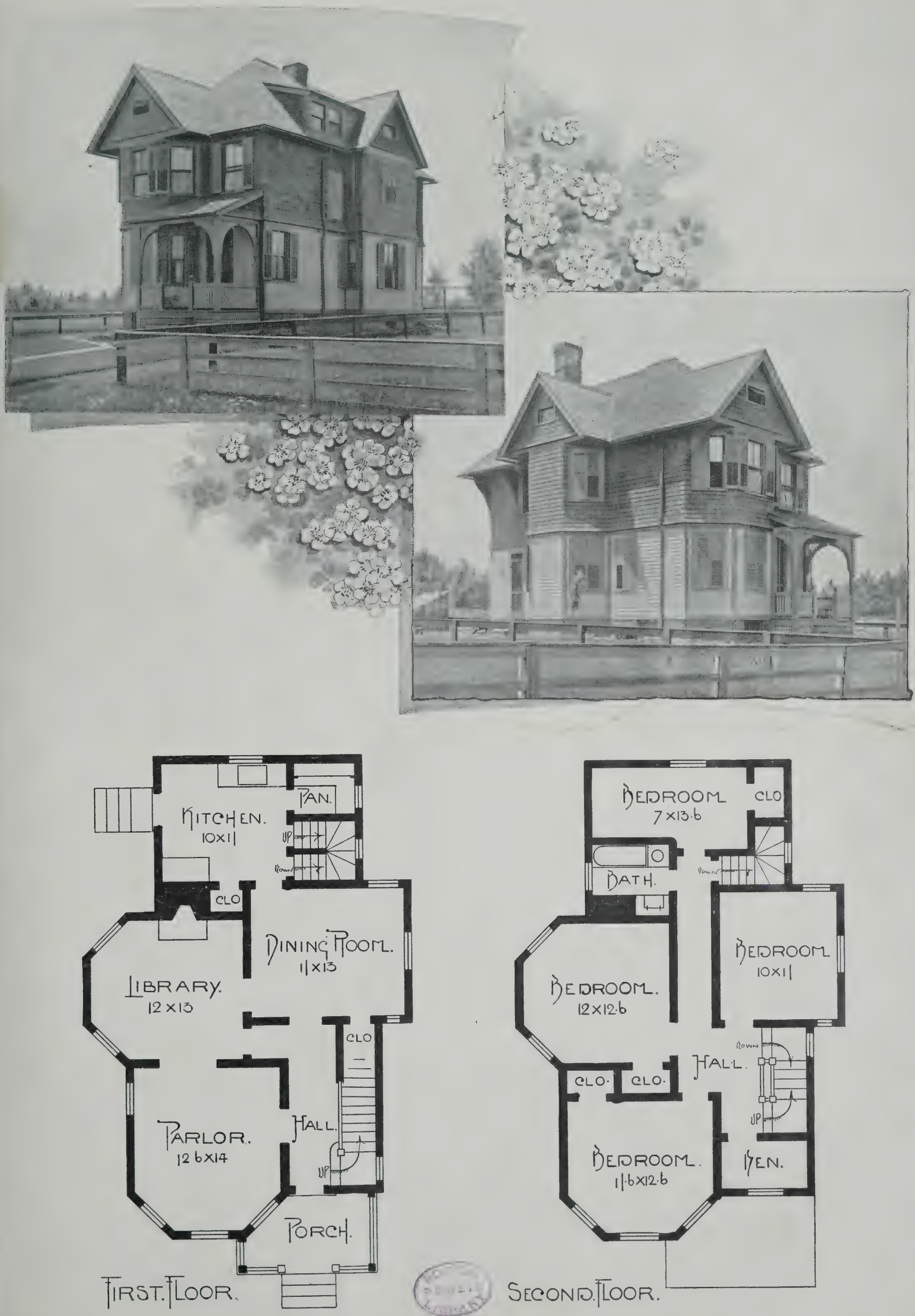
An imitation of black walnut may be manufactured from pine. To accomplish this, one part of walnut-peel extract is mixed with six parts of water, and with this solution the wood is coated. When the material is half dry a solution of bichromate of potash, with water, is rubbed on it, and the made walnut is ready for use.





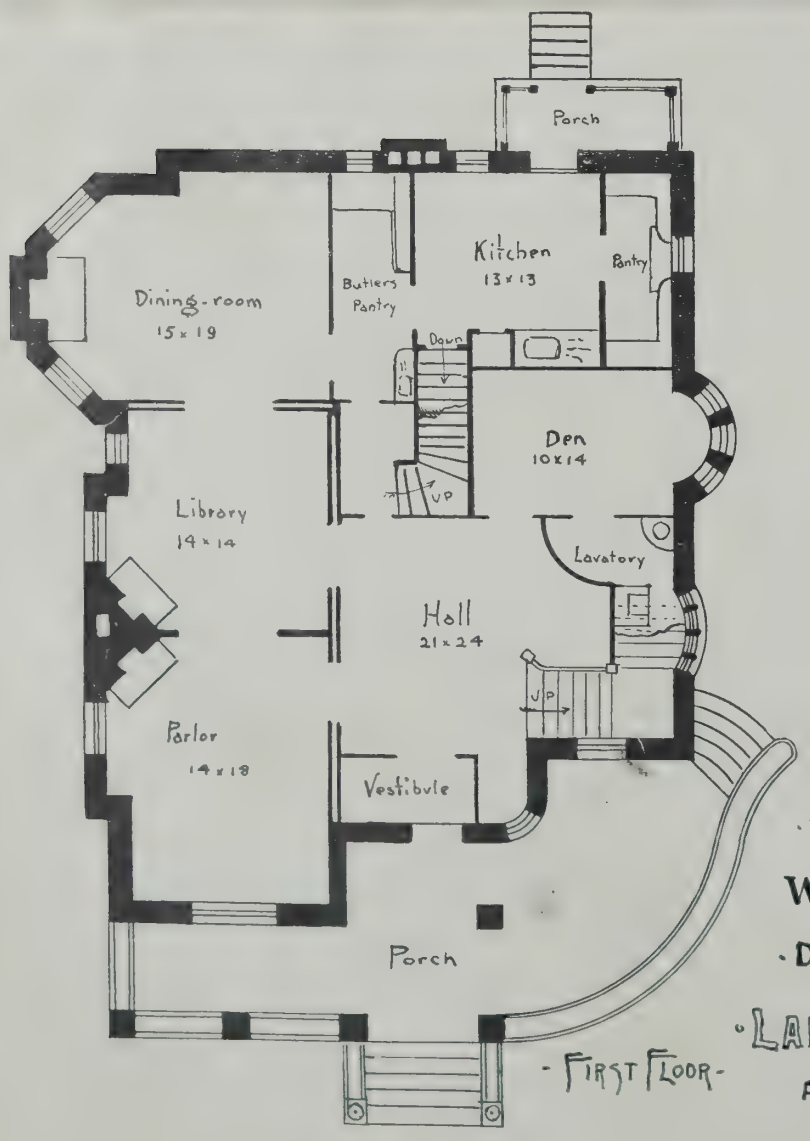
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A RESIDENCE AT HOLYOKE, MASS.—See page 46.



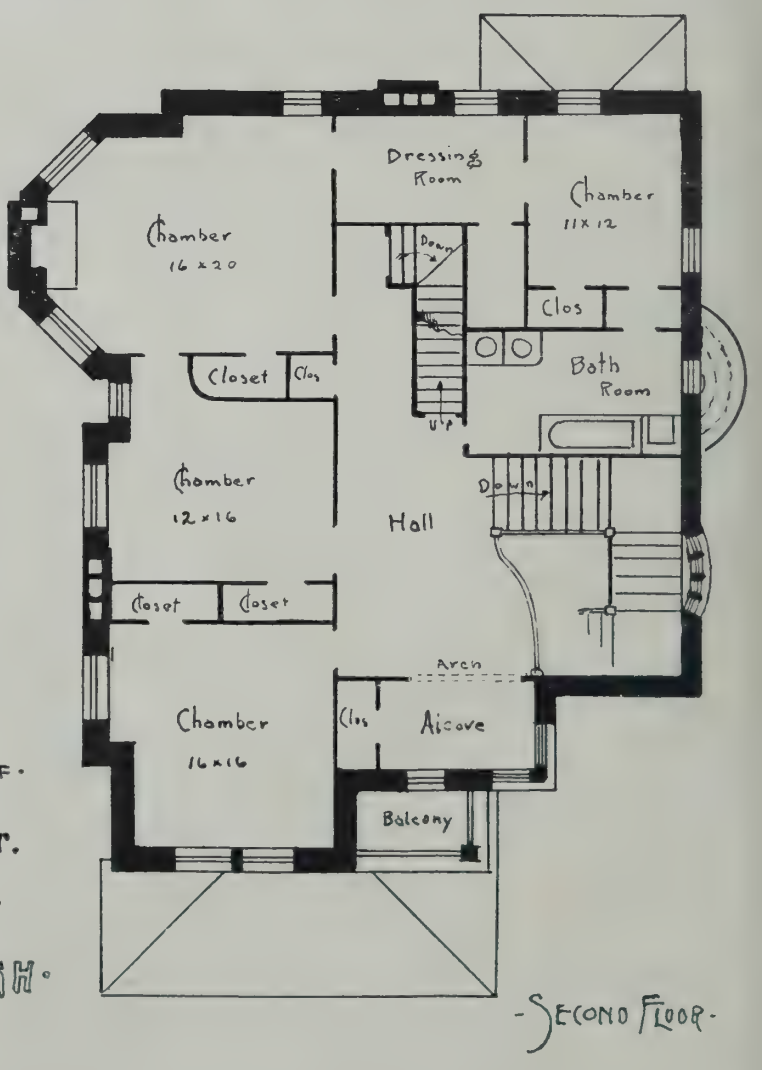
A COTTAGE AT HARTFORD, CONN.—See page 47.





- First Floor -

· Plans · Of ·
· Residence · Of ·
W. R. Mygatt.
· Denver · Colo ·
· Lang & Pugh ·
Architects

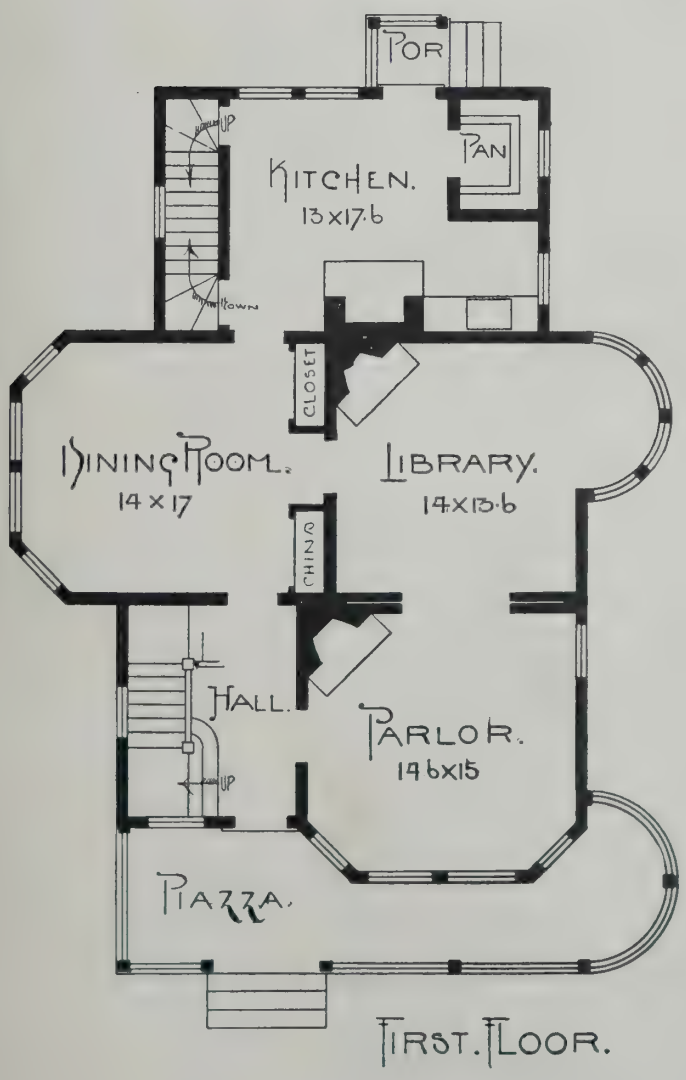


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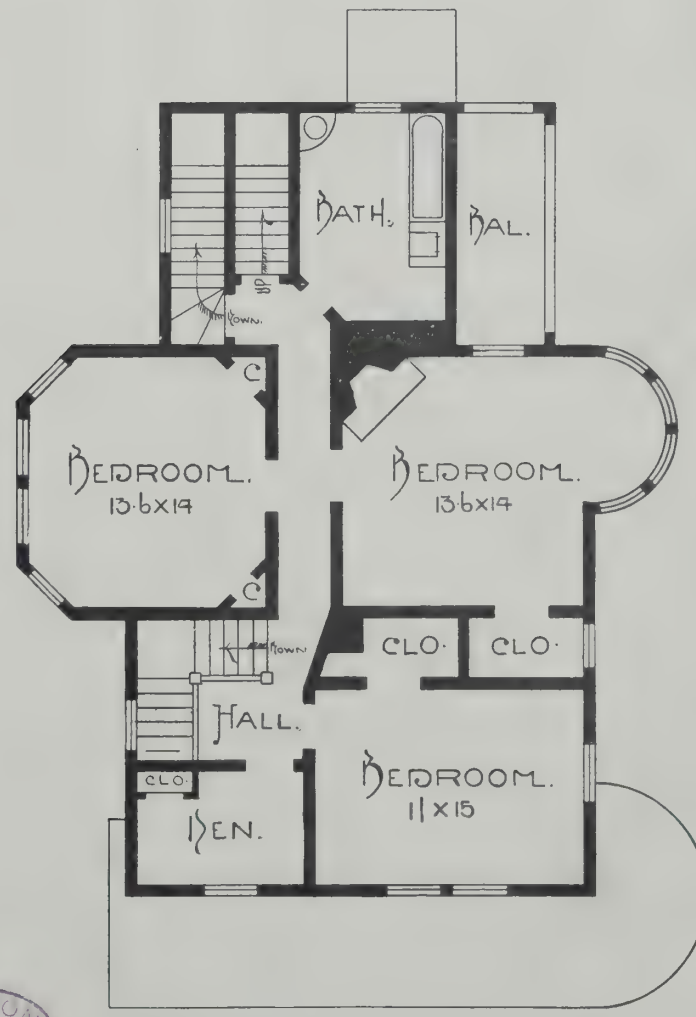
RESIDENCE OF W. R. MYGATT, ESQ., DENVER, COLO.—See page 46.

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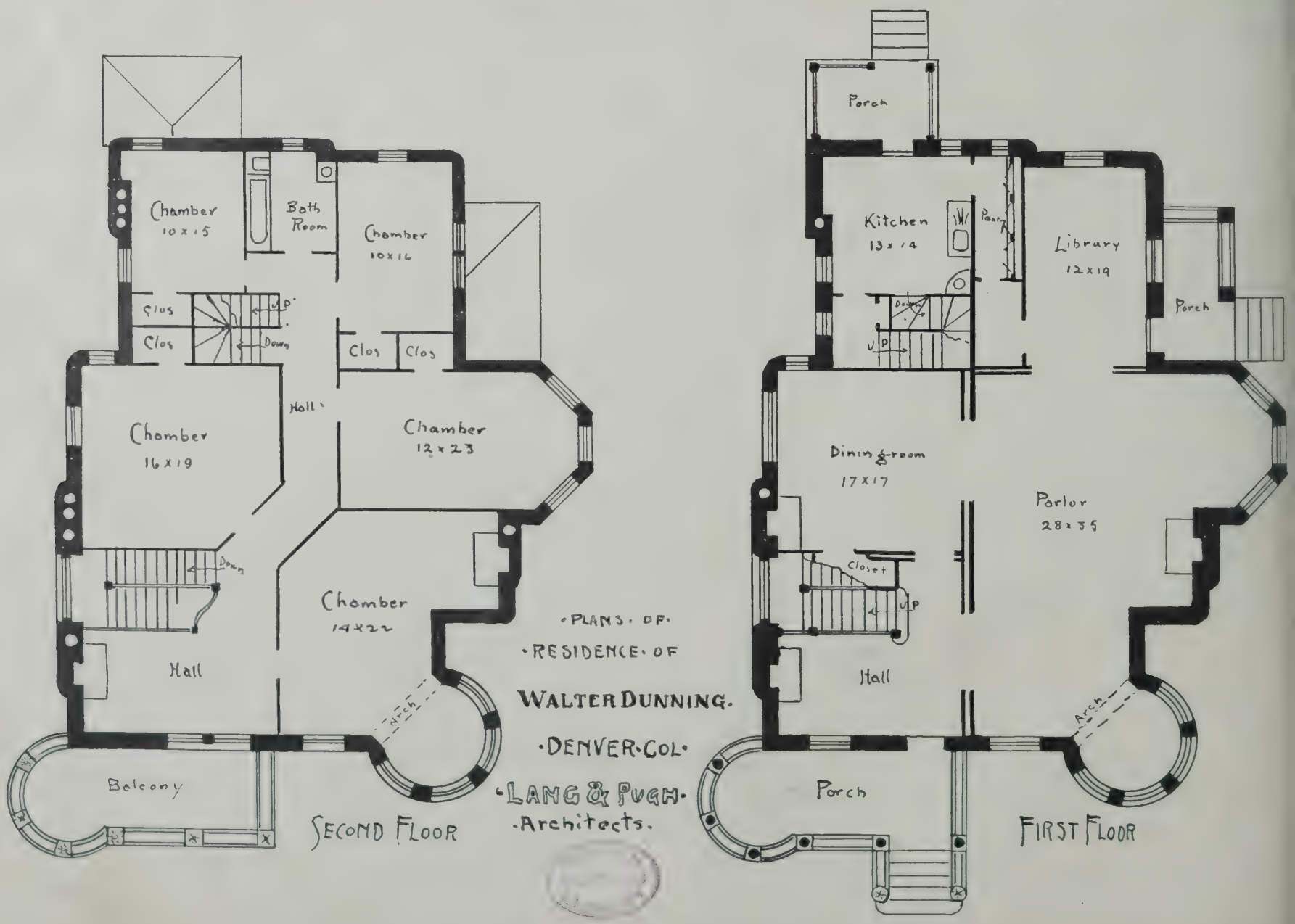


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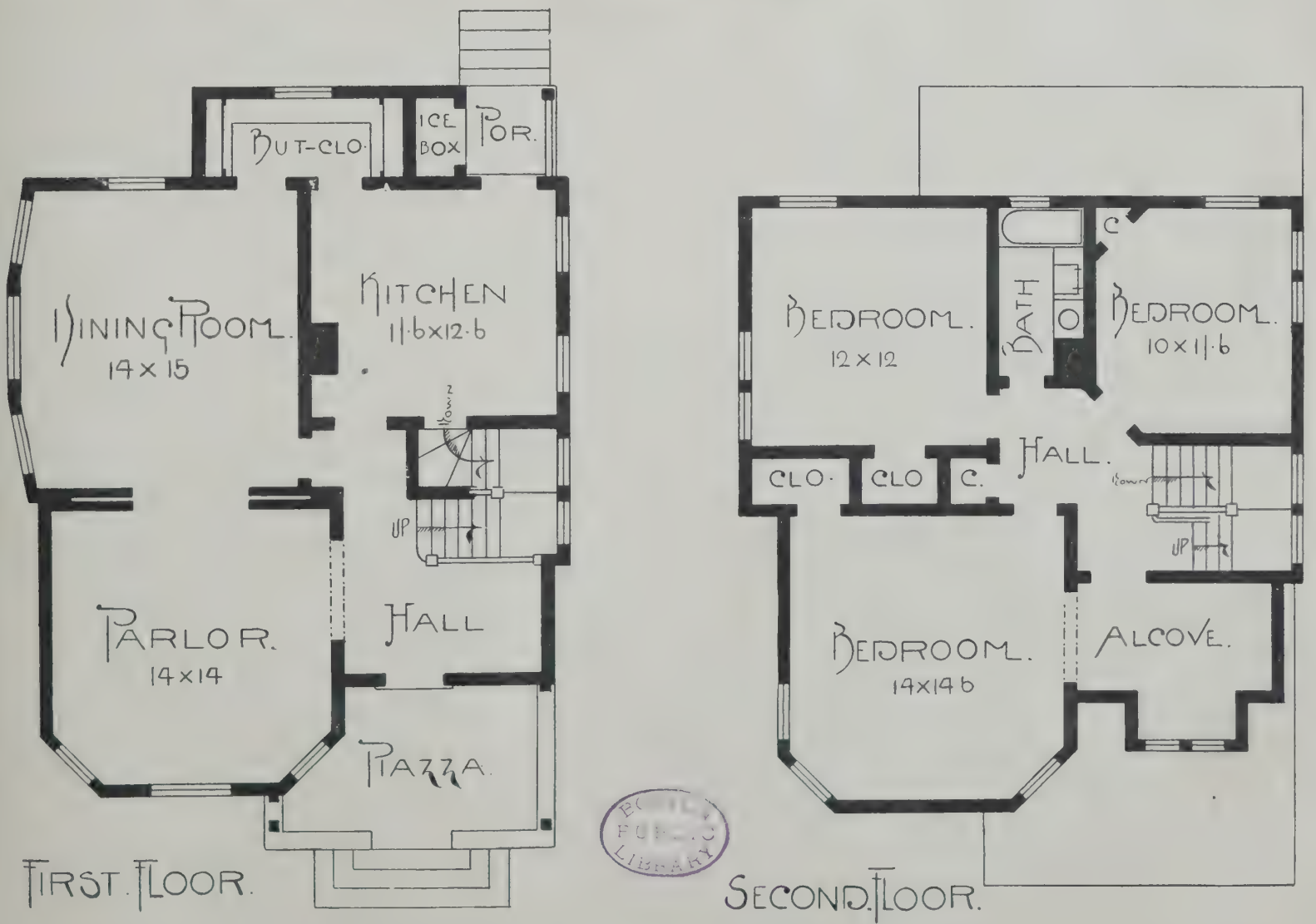
A RESIDENCE AT BRIDGEPORT, CONN.—See page 47.





RESIDENCE OF WALTER DUNNING, ESQ., DENVER, COLO.—See page 46.





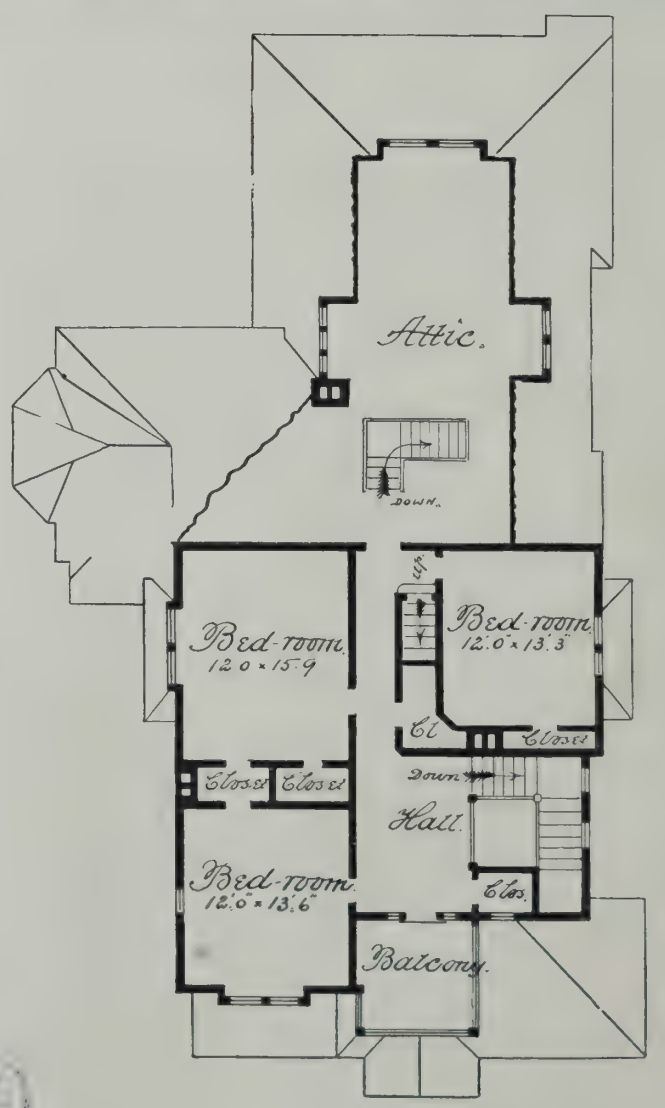
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A DWELLING AT NEW HAVEN, CONN.—See page 46.





First Floor.

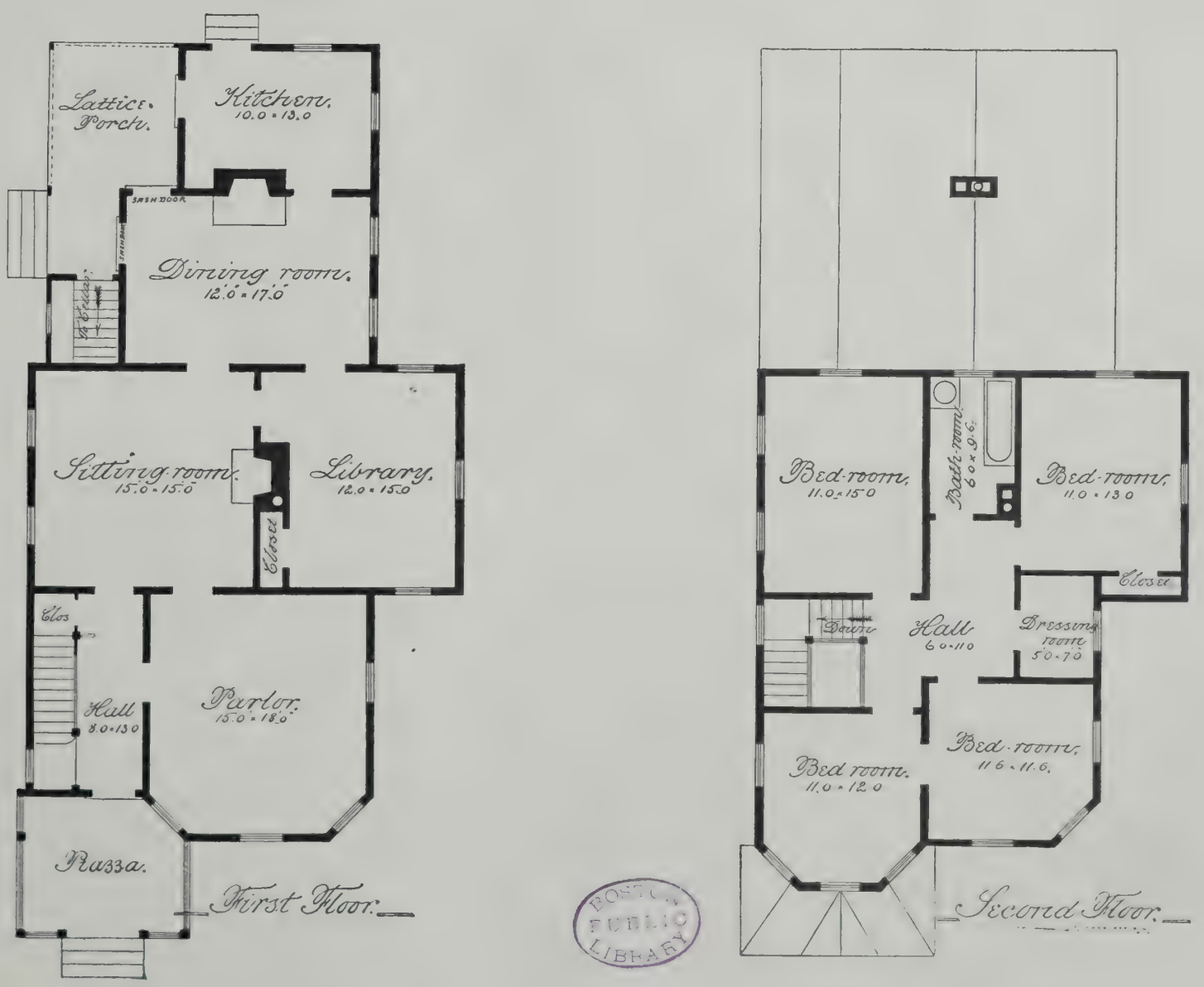


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RESIDENCE OF W. H. GRIFFITH, ESQ., CARTHAGE, ILL.—See page 47.



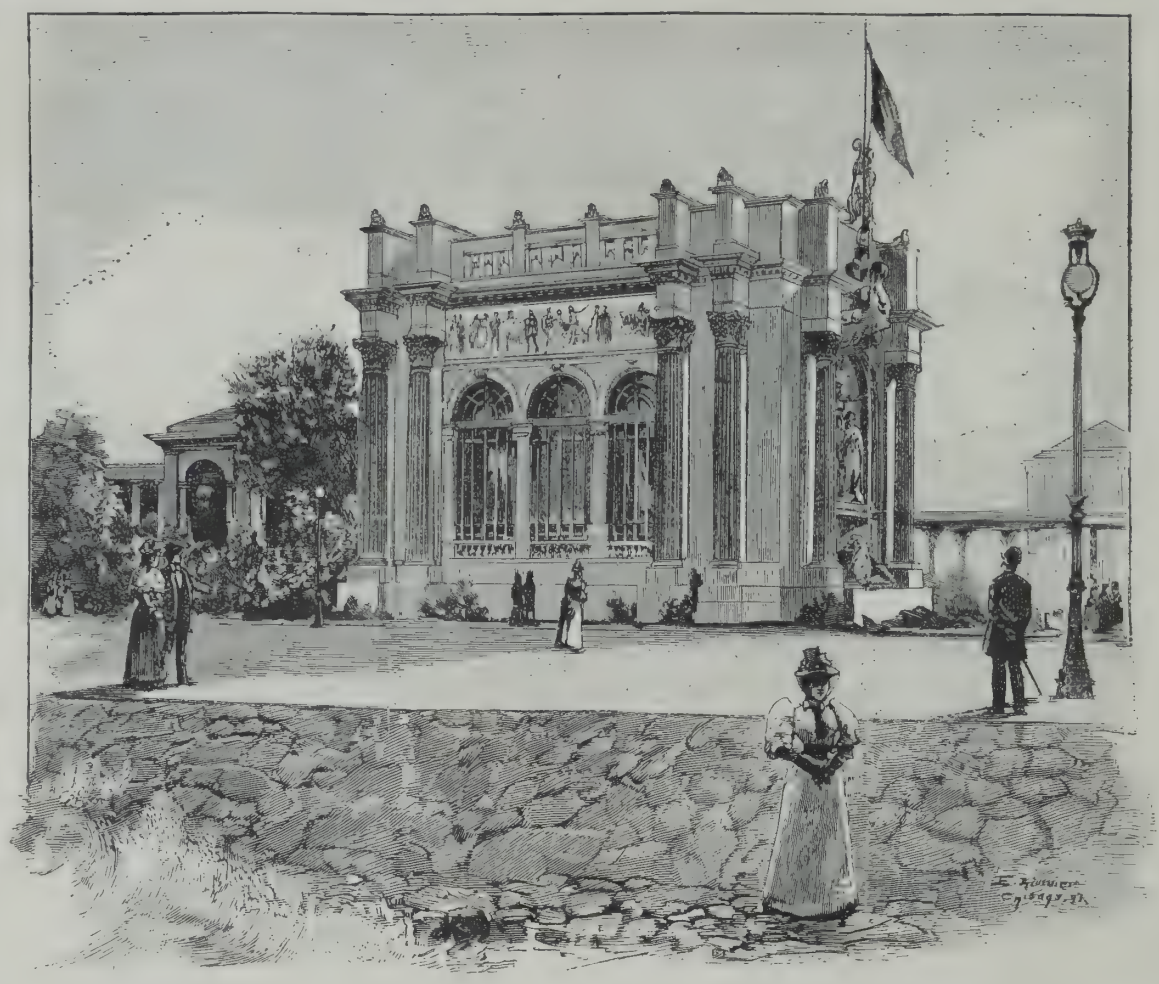


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RESIDENCE OF E. W. SMITH, ESQ., BRAZIL, IND.—See page 47.

THE WORLD'S COLUMBIAN EXPOSITION—THE INTERNATIONAL QUARTER.

THE northern part of Jackson Park is devoted entirely to the individual States of the North American Union, but the northeastern portion has an international character. Along the sandy shore of the great blue Lake Michigan, and on a peninsula that projects out between North Pond and the broad middle lagoon, geography is turned topsy-turvy. Turkey lies between Brazil and Nicaragua, and Hayti between East India and New South Wales, while Ceylon borders on France and Norway on Costa Rica. About two dozen States and colonies have erected their separate buildings here, devoting them especially to national exhibits. The architecture of each building indicates the country by which it has been constructed. By far the largest and finest of these buildings is that of the German Empire. Her two great rivals at the Exposition, England and France, are represented in the international quarter by their special government buildings, but here, as in the different buildings of the Exposition, they are outdone by the Germans, much to the surprise of the Americans, who were not prepared for such a fine display of German art and industry. The main front of the French government building—rich Renaissance style—is turned toward the immense Lake Michigan. Two slightly projecting side pavilions inclose a court that is ornamented by a beautiful bronze fountain and garden plants. One of these pavilions contains the interesting exhibit of the city of Paris, which has already been seen at former expositions; and in the other are relics, documents and weapons associated with the memory of Lafayette, that French hero who offered the aid of his sword to General Washington during the American war of Independence, and whose memory now forms a connecting link between the two nations, France and America. The Swedish building is very peculiar, with its curious pavilions, cupolas, and little towers, representing the Swedish architecture of the sixteenth and seventeenth centuries. The building is shown in the annexed illustration. Sweden and Norway are represented separately in Jackson Park, and as Sweden has no historical connection with America, the artistically arranged exhibit relates to the present industries, arts, objects of interest in this country. Gold and silver ware, Swedish glass and porcelain, products of mines, stuffs, etc., fill the spacious central room, which is decorated with pretty pictures and portraits, while the corner pavilions contain artistic interiors, with Swedish furniture, carpets, curtains, embroideries, etc.

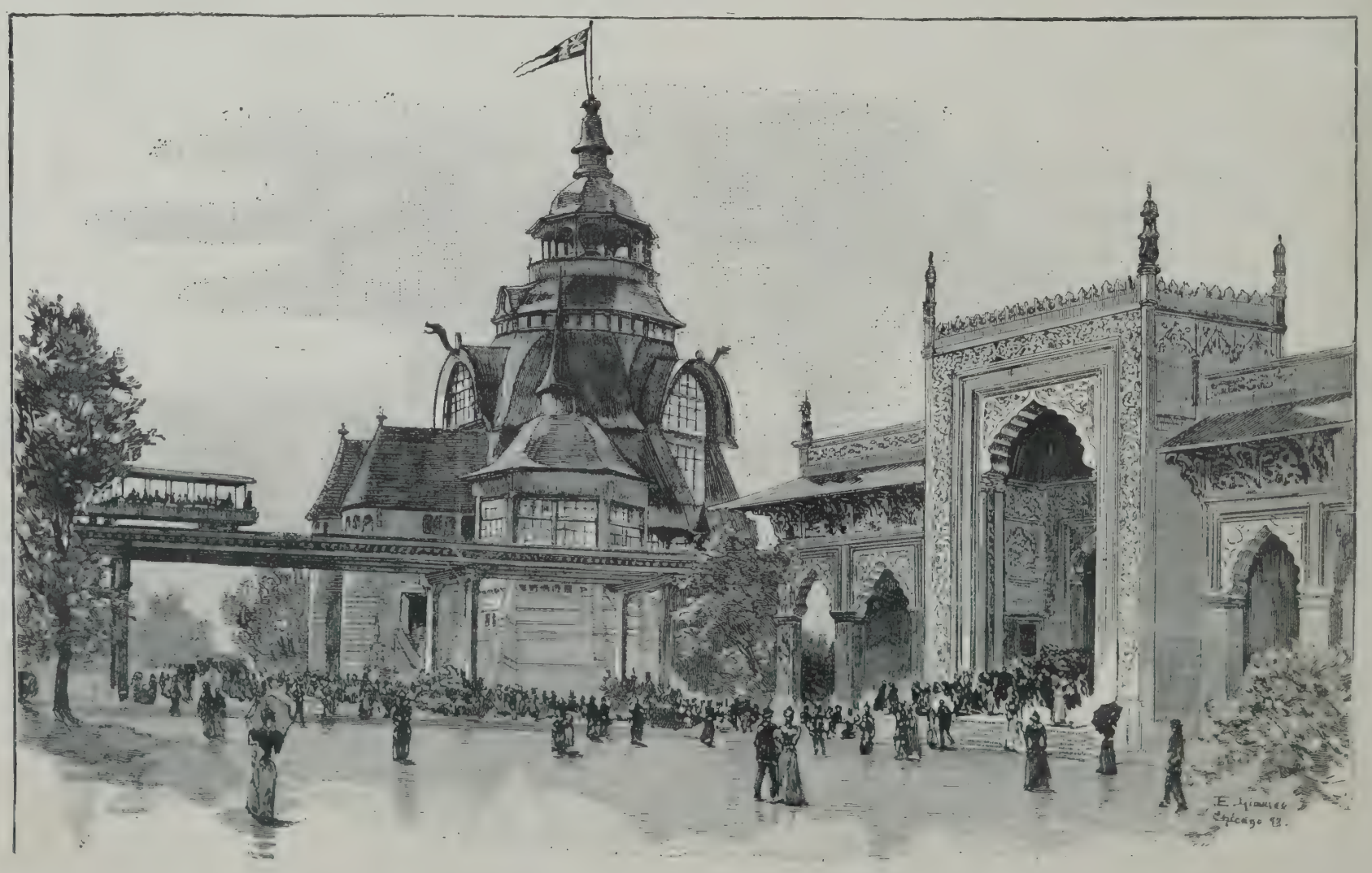


THE WORLD'S COLUMBIAN EXPOSITION—BUILDING OF THE FRENCH GOVERNMENT.

Opposite the Swedish building rises a great pavilion with the colored carving and decoration of Hindostan—not a government building, nothing more than an Indian tea house, with a well-filled bazaar, in which dark-skinned, turbaned Hindoos sell all kinds of bronze, ivory, and wooden wares; colored Indian embroideries, stuffs, shawls, and carpets are stacked up and find a ready market. Unfortunately, all these products show the influence of European culture, and the curious grafting of this on the old Indian is not considered an improvement.

In the narrow space between the Swedish and Indian buildings rush the trains of the elevated railroad, which the Americans have built after the model of the elevated roads used formerly only in New York and Chicago. The tracks rest on light steel pillars, about three feet above the surface of the ground, and on these glide the trains filled with tired visitors of the Exposition. These trains, which are driven by electricity, form the only extensive means of transportation in the grounds. Here we have one of the strange contrasts of the Exposition: in the midst of a land in which transportation facilities play so important a rôle and have been so greatly extended, there is absolutely no railroad except this elevated railroad. And how much they are needed in an exposition where the visitors have to walk distances of from three to five miles! To be sure, there are gondolas and little steamers on the lake, but they run over very short routes, and the roller chairs, which are rolled over the gravel walks by university students (?) in uniform, cost for a single ride 50 cents! A narrow gauge road of the Decauville system, such as they had at the Paris Exposition, would carry millions! And these are the practical Americans!—*Illustrirte Zeitung.*

MASONRY may be made impervious in positions exposed to direct contact with water by the application of coal tar. The latter is employed in a boiling state in one or more layers, or it may be made to flame up before being used, the first being suitable for surfaces exposed to the air, while the second is appropriate in the case of parts to be covered.



THE WORLD'S COLUMBIAN EXPOSITION—BUILDINGS OF SWEDEN AND INDIA.





THE NEW YORK STATE WORKINGMAN'S HOME AT THE WORLD'S FAIR.

NEW YORK WORKINGMAN'S HOME AT WORLD'S FAIR

Near the southeastern corner of the grounds, about equally distant from the end of South Pond and the Anthropology Building, is the little frame house, easily unnoticed by the casual visitor, put down on the map as the New York Workingman's Home.

The history of the experiment here being tried may be briefly told. For several years Professor Salmon of Vassar College has been collecting statistics in regard to domestic service and the condition of those engaged in it, partly, as it now appears, with a view to benefiting such women. Meanwhile, Mr. J. B. Thatcher, of Albany, has been much interested in the welfare of workingmen, and it is through his generosity that this house has been built. It is a story and a half high, and contains a narrow hall, and small kitchen, pantry, bathroom and living room on the first floor, and two bedrooms and a storeroom above. It cost $1,000, and is supposed to be about what a man could rent in the country for ten dollars a month, but has rather more space than could be had in a tenement house in the city for that sum. It is fitted up with plain, substantial furniture at an expense of about $200, part of the money which a prudent working man and woman are supposed to have saved before their marriage. Clothing with which they ought to be supplied for comfort, and sufficient for four children, one an infant, whom the couple are supposed to have when the experiment is tried, is hanging in closets or laid in drawers, subject to the inspection of the interested. The purchase and preparation of every article of furniture and dress has been the work of Miss Katharine Davis, of Brooklyn, N. Y., a former student of Professor Salmon, under whose direction and Mr. Thatcher's, as I understand, she has worked. She has shown much good sense and sound judgment in her expenditures. The problem to which she has given months of study in the chemical laboratory is the determination of the food containing the correct proportion of proteids, carbohydrates and nitrogenous constituents which this family can afford to eat. Mr. Thatcher considers it impossible for a man who earns $10 a week to spend more than an average of fifty-five cents a day for food. He asked Miss Davis to find out whether his family can be properly nourished for this amount. The practical test of her experiments has been going on for the past month in this house. For subjects, she has had a Chicago workingwoman, a widow and her three young children, and a Columbian guard. At the beginning of the experiment, they were all carefully examined by a physician, and their weight and general physical condition were noted. Their food has been weighed before each meal by Miss Davis. The *menus* have all been carefully planned in the laboratory, and are based upon chemical analysis. I give bills of fare for two days, taken at random from several pinned to the wall of the living room :

1. Breakfast : Scrambled eggs with milk (10 eggs); bread and butter ; apple sauce—Cost, 25 cents. Dinner : Codfish, milk gravy ; potatoes ; bread ; Oatmeal, with milk and sugar—Cost, 19 cents. Supper : Codfish balls, made from potatoes and fish left from dinner (cost counted there) ; fried cornmeal mush : bread and butter—Cost, 8 cents.

2. Breakfast : Oatmeal mush, milk and sugar ; bread and butter—Cost, 9 7-10 cents. Dinner : Boiled beef ; boiled potatoes ; lettuce ; bread and butter—Cost, 26 cents. Supper : Fried bacon ; bread and butter ; peaches and sugar—Cost, 24 cents.

At the end of the month, August 2d, a physician's examination was to test the success of the experiment,



AN ITALIAN COUNTRY HOUSE OR VILLA.

and in due time the results will be made public. Obscure as this house is, many people have found it, and a considerable number of plans of the house have been sold on request, and copies of bills of fare and expenditures in furnishing have been taken. These have gone from Maine to California and from Australia to Europe. This unique object lesson can hardly fail to be valuable in more ways than one.

Antinonnin.

(ORTHODINITROCRESOLKALIUM.)

This is a new product of German manufacture which appears to be destined to take a prominent place among the insecticides, as an exterminator of insects injurious to vegetation, parasites of all kinds and rodents. It also furnishes a means of impregnating and protecting wood or lumber. It is the result of experiments of Drs. C. O. Harz and Wilhelm von Miller, Professors at the Munich High Schools, who have produced a chemical preparation said to be capable, even in an aqueous solution of 1 : 500, of destroying all caterpillars sprayed with it in from 12 to 24 hours, and, in a dilution of 1 : 1000, of destroying two-thirds of the animals, although powerful poisons in dilutions of 1 : 30 or 1 : 50 were ineffective. Extended experiments, moreover, have shown that Antinonnin, in correct dilution, is entirely safe and does not injure the most delicate plants and trees or their foliage.

Antinonnin is furnished in the form of a yellowish red paste mixed with soap and glycerine. It is easily soluble in water.

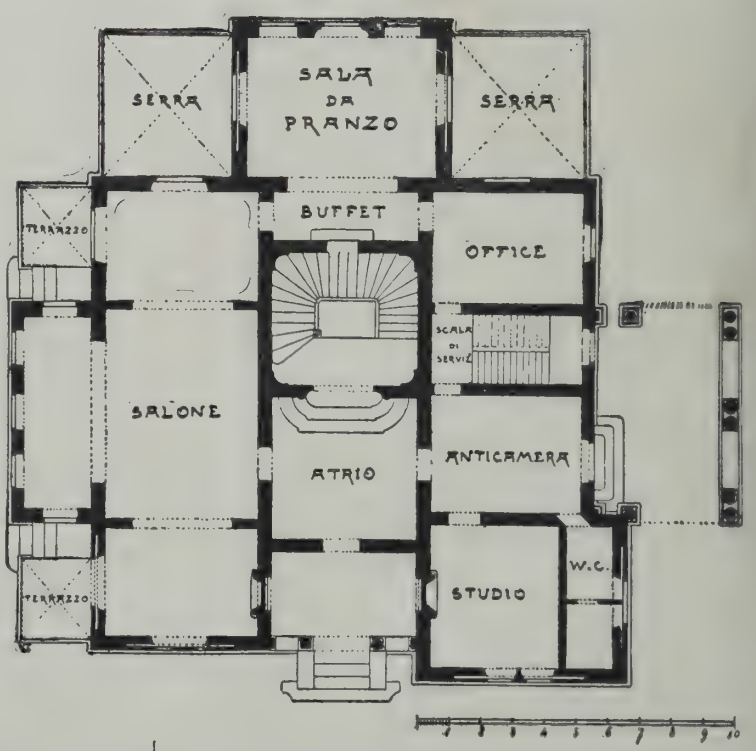
At first intended for the destruction of caterpillars or the gypsy-moth (*Nonnenraupen*, hence the name), which have been so destructive to the forests of Germany, it has been shown by extended observation and experience that the field of usefulness of this preparation is a much wider one, and it is claimed to have high merit for impregnating and preserving wood or lumber. For the destruction of mildew, wood-worms, dry-rot and the lower forms of insects, and as a preventive against mildew or dry-rot, a solution of 1 kilo (2 1-5 lbs.) Antinonnin in 300 litres (630 pints) water is the most effective concentration. The wood is saturated in the usual manner.

Careful investigations have shown that Antinonnin is a very effective agent in the destruction or extermination of rodents, especially rats and mice (field mice). Hitherto phosphorus has been the most prominent agent employed for this purpose, but on account of the many inconveniences attending its use, it would seem desirable to find a substitute for this poisonous substance. Antinonnin is admirably adapted for this purpose, inasmuch as one one-hundredth part of a gramme (.01 gm. or 3-20 of a grain) of the paste is sufficient to kill mice, while rats of ordinary size succumb to about double this quantity. Antinonnin is entirely free from odor and taste, by which properties its usefulness is promoted, while the addition of soap prevents to a certain extent its being eaten by useful domestic animals. This new preparation is being brought before the public in this country by one of the largest and oldest drug houses in New York City, Messrs. W. H. Schieffelin & Co.

Protection of Adjoining Walls.

In order to avoid shattering the walls of the adjoining building by driving piles in the construction of the new Stock Exchange building, at the southwest corner of Washington and La Salle streets, a method peculiar to construction, at least in this city, was adopted, says the *Economist*. Along the west line of the site eight wells were sunk to hardpan, or as near to hardpan as it is practicable to go, ranging in diameter from five and one-half to eight feet, and in depth, from fifty-one to seventy-four feet, varying according to the load to be carried and also the compressibility of the soil. At the bottom they expand in the shape of a bell in order that they may have greater bearing capacity. After the excavating was completed the wells were filled with concrete, tamped all the way to the top, making one solid pier of concrete, and on top of this is placed the cast-iron shoe or bed plate upon which the columns supporting the superstructure rest. The ground at the bottom of the wells was tested while the work was under way, and shows a bearing capacity of nearly four tons to the square foot.

The rest of the foundation is made in the usual way by driving piles and covering them, and this with three feet of concrete.



AN ITALIAN COUNTRY HOUSE OR VILLA.

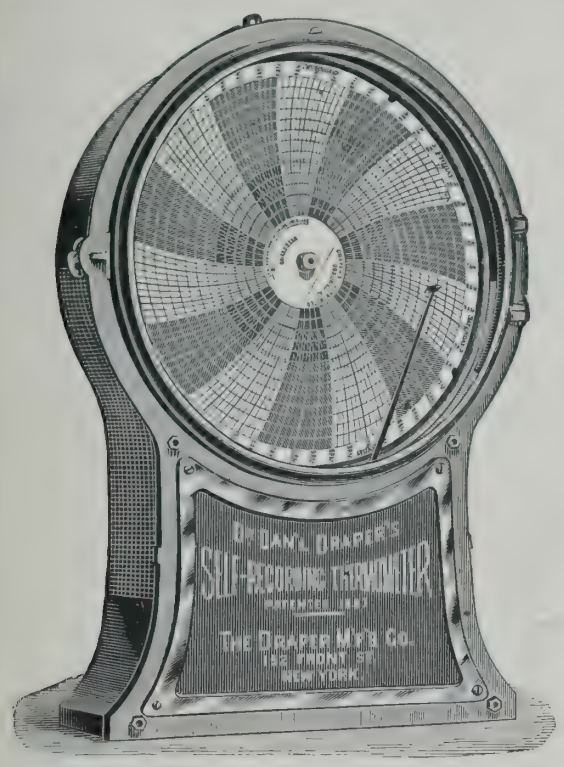
We publish an engraving of the villa erected by the Marquis Matteo Campori, in Castelvetro, from plans drawn by Antonio Citterio, as an example of the happy result that can be obtained by the use of architectural elements of the greatest simplicity.

The external decoration of the villa, with the exception of a wide painted frieze, consists of Verona stone around the windows and eaves, the rest of the structure being of wood, covered with stucco.

The interior is decorated in the style of the seventeenth century, and the annexed plan shows the arrangement of the rooms on the ground floor. The kitchen, etc., are under ground. In the first story are seven bedrooms, divided by two lateral halls, and there are also three toilet rooms on this floor. The servants rooms are at the top of the house. The house is supplied with running water, and is heated by a hot-air furnace.—*L'Edilizia Moderna.*

THE DRAPER RECORDING THERMOMETER.

All those to whom the record of temperature is of value and consideration will undoubtedly be greatly interested in an instrument capable of serving as a permanent, continuous, and thoroughly reliable guide in that connection. There has long been an urgent need of a simple and inexpensive register of this kind in the hospitals, where a physician, upon entering a ward, can tell if the temperature has been kept according to his orders, if it has been too hot or too cold, and whether the welfare of his patients has been consequently affected by any oversight.



THE DRAPER RECORDING THERMOMETER.

Then, again, in drying-rooms, or ovens, where constant temperatures are required, so that it can readily be perceived if attendants have kept them at their proper maximum, there is certainly a great necessity for a monitor of such unerring accuracy; while in storehouses, where fruit, vegetables, and other perishable property is likely to be kept, the demand for such a method of recording the condition of the temperature is self-evident.

Breweries, greenhouses, refrigerating railroad cars, theatres, hotels, churches, asylums, schools, and all public buildings, present, of course, admirable opportunities for the illustration of the advantages of such a thermometer, but nowhere is it likely to be found more acceptable than on the porch or piazza of a suburban home. There it has special appropriateness as an accessory to the domestic comfort. The Draper Manufacturing Co., 152 Front St., New York City, which was awarded the gold medal by the Massachusetts Charitable Mechanic Association, in 1887, and the special silver medal of merit by the American Institute, in 1888, for its meteorological instruments, is to be congratulated upon having solved this thermometrical problem. In its self-recording thermometer all the features that have been mentioned are very felicitously combined.

Their instrument consists of six parts—an iron frame, a clock, a metal disk, two metallic thermometer strips, a recording pen lever, and a case. The clock revolves the disk, on which is placed a chart indicating the hours of the day, and the days of the week, by radiating divisions, giving the degrees of temperature, Fahrenheit scale, from 50° below zero to 80° above, 20° below zero to 110° above, 70° to 200°, and 0 to 260°, by concentric circular divisions. The recording pen lever is supported on an axis, carried by the expansion and contraction of bimetallic strips, so that the pen, which rests on the chart, moves outward and inward from the centre, drawing a line on the surface of the chart, and showing the temperature at any given time.

The instrument is very accurately adjusted, and is fully warranted. It is provided with ink, a dropping tube to fill the pen, and twelve charts. The iron frame is the backbone of this thermometer, and to it are fastened the clock, the two metallic thermometer strips, the frame for holding the recording lever, and also the perforated case to protect all the moving parts.

The clock is a fine eight-day spring clock movement, specially made for the purpose, having on its hour arbor the metal disk, which is revolved by the clock once a week. To this metal disk is fastened, by suitable means, the paper chart. The metallic thermometer, or strips, are made of two metals fastened together by suitable means. One of the metals, expanding more than the other, causes the compound strip to bend in one direction with an *increase* of temperature, and in the other direction with a *decrease* of temperature, and, being thin and long, the metals present a large surface to the air, and are therefore very sensitive to changes of temperature.

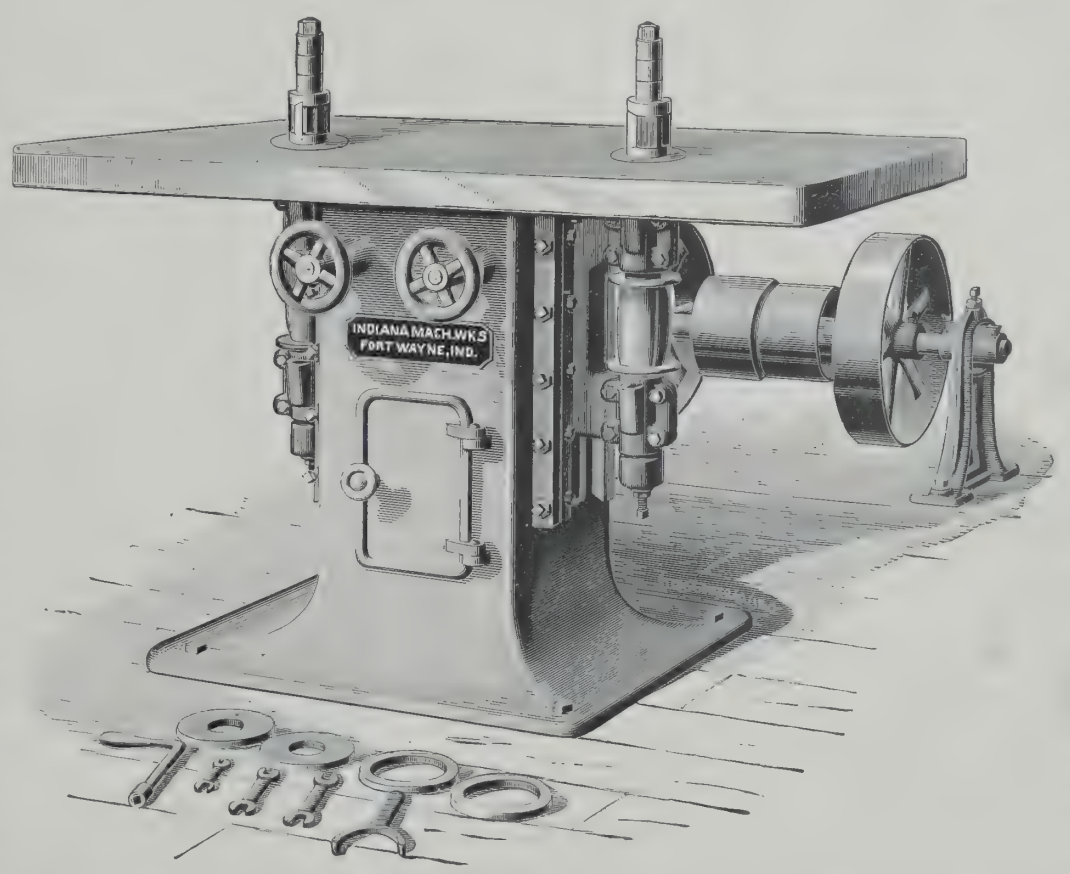
The recording lever frame is fastened to the iron frame. On the arbor that carries the lever are two small arcs, so as to connect by means of two fine wires the two metallic thermometer strips to the lever. To this arbor is also fastened a frame carrying two screws for adjusting the ink pen on the lever to the right degree of temperature on the paper chart. The case is made of copper, and is perforated so as to have a free circulation of air around the metallic thermometer strips, and also to protect them from injury. The case is fastened to the iron frame.

Improved Elevators.

The new catalogue just issued by the Graves Elevator Company, of Rochester, N. Y., illustrates and describes many kinds of elevators and many new devices for speed, safety and economy. The several systems described are: Hydraulic, electric and steel screw passenger and freight elevators, also the patent spur gear freight elevator. In the last pages of the catalogue is published a list of over twenty-six hundred actual users of the Graves elevators, comprising hundreds of the best business houses, hotels and office buildings in the country. The Graves elevators have been in use since 1875, and lately the sales have increased so rapidly that they are constantly making additions to their already large plant, having just finished a substantial five-story building, 60 x 100, to be used for building cars. Those contemplating the purchase of elevators will find it to their advantage to send for one of these catalogues.

AN IMPROVED WOOD-WORKING MACHINE.

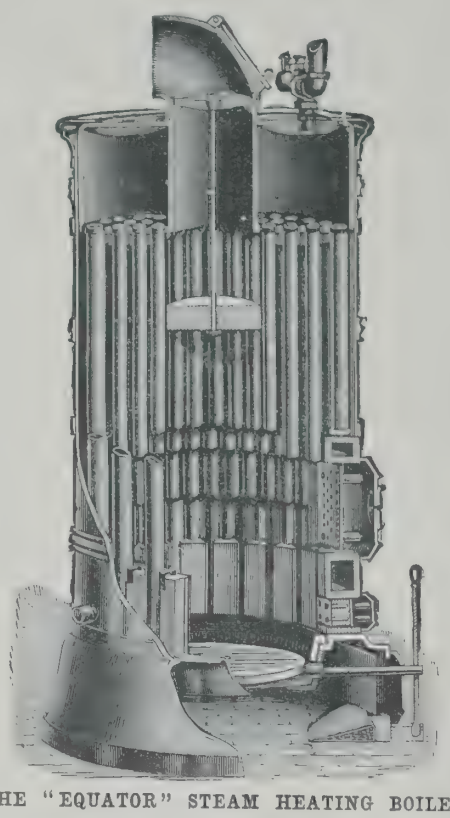
This improved double spindle friezing and shaping machine has iron or wood table and elevating spindle yokes. It is especially designed for planing mills, carpenters, pattern, machine work, etc. The frame is cast in one piece cored out, and has large floor bearing, which insures strength, stiffness and solidity, and will be found to stand up without jar to heavier work than most other machines of its class in the market. The upright spindles are very large, of fine steel, and run in reverse directions. The spindles run in separate yokes with connected boxes, and the yokes raise and lower in dovetailed slides provided with gibs and adjusting screws, so that any wear may be readily taken up; the spindles are raised and lowered by means of shafts and hand wheels shown in cut, and may be adjusted very accurately. An improved step, in which the spindle rests, makes it possible to take up all lost motion, and is a decided improvement. The spindles are 26 inches from centre to centre, and carry three-inch steel heads. The machine is first-class in every particular; the materials are the very best throughout, and the weight and strength well distributed; genuine Babbitt metal is used in all bearings, and the boxes are self-oiling. Weight, with wood top, 1,200 pounds; with iron top, 1,450 pounds. Further particulars will be furnished by the manufacturers, the Indiana Machine Works, Fort Wayne, Ind.



DOUBLE SPINDLE SHAPER AND FRIEZER, MADE BY THE INDIANA MACHINE WORKS.

HOUSE HEATING BOILERS OF THE NASON MANUFACTURING CO.

An interesting pamphlet on the selection of a house-heating boiler, entitled "10 to 1," has recently been published by the Nason Manufacturing Co., of New York City, the figures of the title indicating that their "Equator" steam heating boiler has, according to the detailed report of an engineer of high standing,



THE "EQUATOR" STEAM HEATING BOILER.

done work equal to the evaporation of 10 pounds of water at 59° F. to steam at 213° F. for each pound of coal consumed. This high degree of efficiency is quite remarkable, and it is not to be wondered at that the company has taken the figures as the somewhat unique title of their little book on house warming, either by steam or hot water, for they also manufacture and have obtained an enviable success in their "Gulf Stream" hot water boilers. The two systems and their relative advantages in different situations are here fully explained. Both boilers are of the drop-tube pattern, the outer tubes longer than the centre ones, about half the circumference of the fire being surrounded by fire-brick and half by water tubes. The grates are shaking and dumping, of very simple construction, and the workmanship and material throughout are of the best, the boilers being designed to meet every reasonable requirement at a moderate cost.

Slow Burning Dwellings.

The novel earthenware cottages, built by Mr. Gilman in the lower part of the town, are efforts of his toward a house architecture that cannot by ordinary means be made to burn. The principles involved in this incombustive construction employs the old-fashioned balloon frame of pine, but sheathed outside and in with thin sheets of brickware, nailed to the frame instead of boards and siding, which in turn are coated with hydraulic cements or common lime mortar, affording roof, outside walks and floors of stone, and ceilings and partitions lime plastered.

The openings of the house, doors and windows are built of wood, but its further use practically ends.

Such construction of itself comes pretty near being fireproof, and at a cost not exceeding that of the time-honored kindling wood sort of the present day; but the inventor goes a step further and "chemicalizes" the pine lumber in the structure, and makes
under ordinary conditions, or even s
by a grate fire of hard coal, if the ow
fray the additional small expense atte

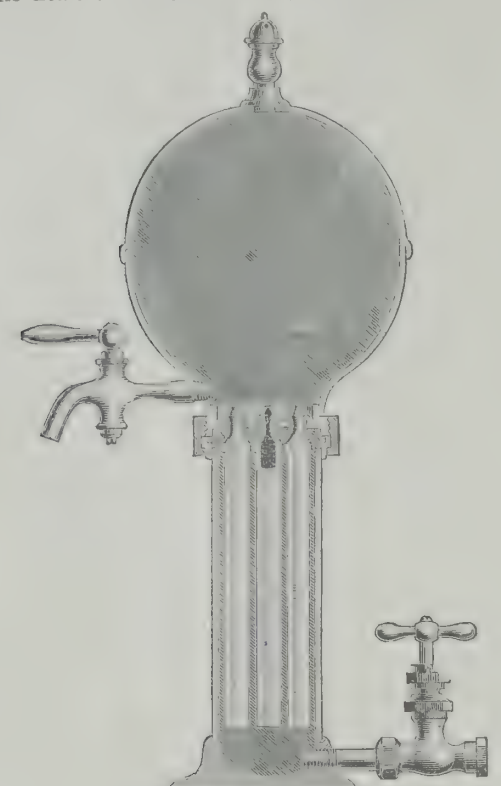
Naturally enough, such a marked innovation of present building methods and materials invites great attention, not only on the part of our citizens from motives of curiosity at the novelty originating in their midst, but also of practical builders from abroad, who see in it a marked advance in the great question of a "safer house construction," which agitates at present every part of the civilized world, a goodly number of which visited Eldora last week to see and examine for themselves.—*Eldora, Iowa, Herald.*

THE PASTEUR FILTER.

ITS VALUE AS A SAFEGUARD AGAINST CHOLERA AND OTHER EPIDEMIC DISEASES.

A cablegram from Vienna on August 30th announced the first death in that capital from cholera as being due to the drinking of unfiltered water from the Danube, while two fresh cases of Asiatic cholera were reported on the same date from Berlin, and were also attributed to the drinking of city water. The newspapers in the latter city were urgent in their demands that the city water works at Stralau, on the Spree, be closed, as they were generally believed to be infected.

This should certainly renew attention to the subject of the bad quality of drinking water in many places in this country, which has too frequently been the direct cause of the outbreak of typhoid fever, marsh fever, diarrhœa and dysentery. Unless well controlled, the purity of the water has an appalling significance in relation to the public health. Modern methods in connection with the



THE PASTEUR FILTER.

filtration of water have simply sought to obtain a clear liquid, free of mud and other suspended matter, until Pasteur's researches clearly proved that the greatest number of so-called contagious or epidemic diseases were due to the presence of microbes or germs, thereby causing a fermentation, or a chemical change, capable of resulting in disease and death. As early as 1857 Pasteur had discovered the part acted by microbes, and made it known to the public at large in his work on ferments. Later on, in 1864 and 1865, he revealed the cause of alterations or diseases of wines, beer, vinegar and silkworms.

In a speech made at the sitting of the Academy of Sciences on January 27, 1877, he said:

"Among microscopic organisms, I do not think that any could be found in larger quantities on the surface of the earth than bacteria. The dust suspended in the lower portions of the atmosphere, or spread on the surface of all bodies, always contains some germs of these organisms. The water of rivers is constantly polluted with them, and the smallest pool of ditch water contains millions of them; particles of atmospheric dust carry them to the ground, where they are collected together by rain water in a state of undoubted fecundity. Now, the germs of these organisms so powerfully resist destruction that they can stand many a change of heat and cold, dampness or dryness, and even a temperature of more than 212° Fahr. (boiling point) in a neutral or alkaline medium of culture. Some of them are not destroyed at a dry temperature of 225° Fahrenheit. Water distilled in our laboratories always contains some germs, although in smaller quantity than in ordinary water. Water distilled in flasks absolutely free of germs, is perfectly pure, from the point of view where we stand, that is to say, free of any germs of lower organisms."

To protect ourselves against all the dangers brought by drinkable water, it should be separated from all the microbes or germs which it may contain, whilst retaining its gases and salts. This important result has been lately reached, and this vital question is now settled for the benefit of public health. The problem was solved in Mr. Pasteur's laboratory, where liquids containing microbes are filtered, in order to separate the latter from the liquid in which they are bred. This has been accomplished by the now universally known Chamberland filter tube.

The Academy of Sciences, France, at its annual meeting of December 21, 1885, showed its appreciation of the really scientific character of their apparatus by bestowing on its inventor, Mr. Chamberland, the Monthyon prize. In a letter under date of March 1, 1886, Pasteur says:

"As to this filter, invented and tested in my laboratory, rewarded by the Academy of Sciences with one of its prizes, the full hygienic and scientific value of which I am thoroughly acquainted with, and after duly thinking the matter over, I authorized Mr. Chamberland to add the words 'Système Pasteur' to these—'Filter Chamberland.'"

The Pasteur filter is so simple in principle and construction as to be readily comprehended by the ordinary observer. It is made in two kinds, which are distinguished by the terms pressure and non-pressure respectively, both kinds alike using the same germ-proof filtering medium.

The pressure filter is designed to be attached to the pipe supplying the house with water from the city main or an elevated tank. It is made of brass, plated inside with pure block tin and outside with nickel, making it handsome, non-corrosive, and of sufficient strength to resist several hundred pounds pressure. It has two separate chambers, joined one above the other by means of a screw collar and rubber gasket, except the suspended style, which discharges the water direct without the intervention of the secondary chamber. The lower chamber contains the germ-proof filtering tubes, suspended from the bottom of the upper chamber, through which the nipple end of the tubes is inserted and held firmly by rubber collars, which also prevent the passage of unfiltered water. The water from the pipe is admitted into the lower chamber, and by its own pressure is forced through the walls of the tubes into the upper, or filtered water chamber, from which it is drawn as desired. The pressure filter, under sixty pounds pressure, in comparatively clear water, will supply three gallons of water an hour per tube.

The non-pressure filter is designed to filter by the weight or gravity of the water poured into it from time to time. It is made of two chambers, one placed on top of the other. The upper chamber contains the filtering tubes, the nipple ends of which are inserted through the bottom, and held firmly by rubber collars to prevent the passage of unfiltered water. The unfiltered water is poured into the upper chamber, and percolates through the walls of the tubes into the lower, or filtered water chamber. The non-pressure filter will yield about 1½ gallons per tube in twenty-four hours.

These filters are made by the Pasteur-Chamberland Filter Co., whose Eastern department is at 4 West 28th Street, New York City.

THE WILLER MANUFACTURING COMPANY'S EXHIBIT AT THE WORLD'S FAIR.

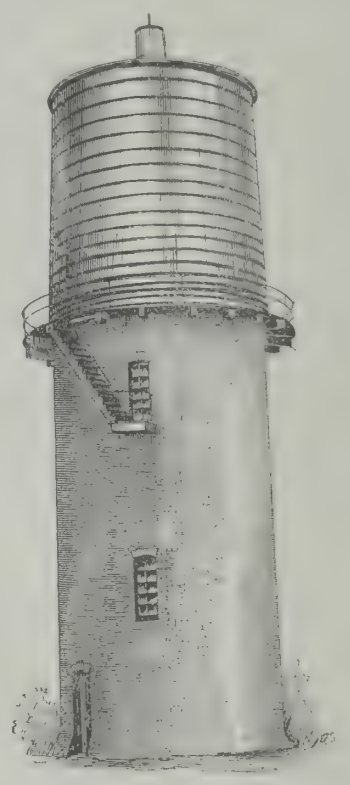
The illustration represents an exhibit at the World's Fair by the Willer Manufacturing Co., of Milwaukee, Wis., and Chicago, Ill., manufacturers of the Willer sliding blind, one of the first improvements in this line put on the market possessing real merit and meeting the demands of a discriminating public. The sliding blind is the principal specialty produced by this company, and it is brought out by them in a variety of grades, finishes, etc., to suit the tastes and requirements of the wealthy and extravagant as well as the financially less fortunate and economical builders of houses. Besides the sliding blind, the company has for years produced the old standard folding blind and a special folding blind of their own, as well as custom-made screen doors, sliding and stationary window screens for all classes of buildings. They have lately also added a Venetian blind department to their business, and are producing the blind in a variety of styles—the English Venetian blind as well as a new sliding Venetian blind, which latter blind is not drawn up by cords, but operates the same as a sliding blind, being balanced by springs or weights, or by both, and remaining in any desired position in the window. All the company's various products are shown in a well-designed pavilion located on the gallery in the north end of the Manufactures and Liberal Arts Building.



THE WILLER MANUFACTURING COMPANY'S EXHIBIT AT THE WORLD'S FAIR.

CEDAR AND CYPRESS TANKS, ETC.

The use of wood tanks for a water supply system, where the number of consumers is not too large, oftentimes



WATER TANK AND TOWER, MORRISTOWN, N. J.

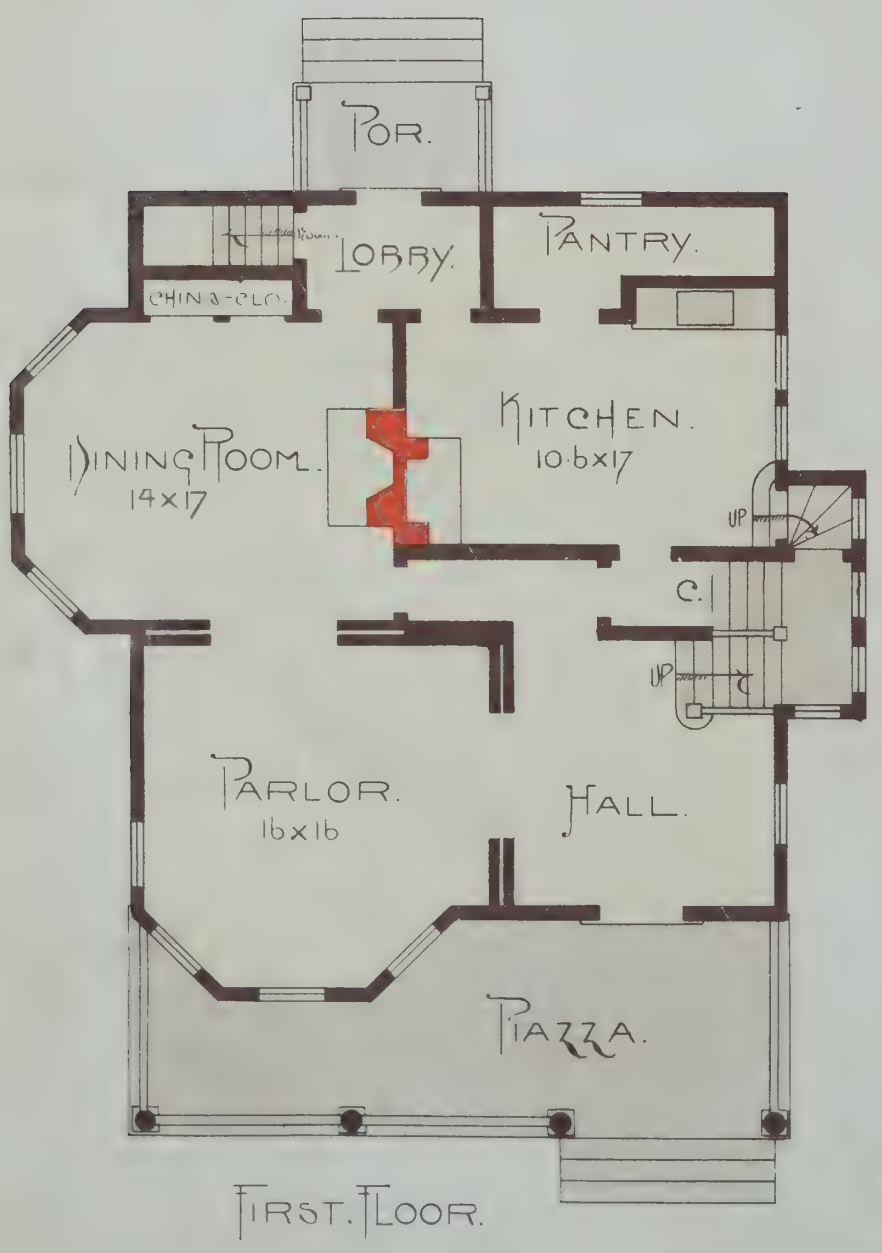
affords the most convenient means of supplying a necessity, where the location would render other methods far more expensive. The illustration represents a tank of this kind at Morristown, N. J., of 100,000 gallons capacity, placed on a brick tower, to give a good pressure over quite a large area. The tank is 28 feet in diameter and 25 feet high, made of three-inch cedar. It was built by Geo. Woolford, of No. 2238–50 North Ninth Street, Philadelphia, who manufactures cedar and cypress tanks, vats, dye tubs, etc., of all sizes, for a great variety of purposes.

A Party-Line Quarrel.

The *Christian Union* gives the following grateful variant upon the ordinary outcome of party-line quarrels: An acquaintance of the *Spectator*, about two years ago, built a house in New York. When the walls were up and the framing of the roof in place, he was informed by the man who owns the adjoining property that the new house was six inches on his land. The *Spectator's* friend offered to pay very handsomely for the six inches that had been built upon by mistake. The owner of it would not sell. He said that his plans were all made for occupying the whole of his lot, and for no consideration whatever could he part with the six inches. The *Spectator's* friend could do nothing else than tear down his wall. This was done, and the wall moved back twelve instead of six inches. Then the owner of the neighboring property put up his house, and placed his wall just against that of the finished house. Of course this wall was now on the land of the *Spectator's* friend, who made no remonstrance until his neighbor had finished his house, furnished it, and moved in with his family. Then he called and informed the obdurate man of the fact. He was speechless with rage. The *Spectator's* friend then handed him a deed to the six inches, saying, "I did this just to make you realize how meanly you had acted toward me. I have no wish that you should be put to any expense. I make you a present of that six-inch strip." The *Spectator* is of opinion that if revenge is ever justifiable it was in this instance.



A DWELLING AT BRIDGEPORT, CONN.



FIRST FLOOR.



SECOND FLOOR.



A PHILADELPHIA RESIDENCE



SCHUMACHER & ETTLINGER, NEW YORK.

SCIENTIFIC AMERICAN

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A PHILADELPHIA RESIDENCE.—See page 62.

Scientific American.

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NEW YORK, NOVEMBER, 1893.

THE

Scientific American,

ARCHITECTS AND BUILDERS EDITION.

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A DWELLING AT BRIDGEPORT, CONN.

One of our plates in colors, in this issue, shows a dwelling, of excellent design, recently completed for Thomas Cook Wordin, Esq., at Bridgeport, Conn. An additional view is given on page 63. The special features of this design are the shady piazza at front and the bay and dormer windows. The plan is a unique model. The rooms are fair sized, and well arranged for light and comfort. The building is constructed of the best materials, in a thorough, workmanlike manner. The underpinning is built of local bluestone, and the building above is covered on the exterior with shingles, and painted light olive green with darker trimmings. Blinds painted bottle green. Roof shingled. Dimensions: Front, 39 ft.; side, 37 ft. 6 in., exclusive of piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The interior throughout is trimmed with whitewood, stained and finished in cherry, except dining-room, which is finished in oak. Hall contains an ornamental staircase, with paneled newel post. Parlor and dining-room are separated by double sliding doors. Dining-room has a china closet built in, with drawers and shelves above, inclosed with doors, glazed with beveled plate glass, and a fireplace furnished with tiles, and a hardwood mantel of oak, with mirror. Kitchen, lobby and pantry are wainscoted, and the former contains a sink, fireplace for range, and stairway to landing of main staircase. The second floor contains four bedrooms, large closets, and bathroom, and the third floor contains two bedrooms and trunk room, besides ample storage. Bathroom is wainscoted, and provided with the usual fixtures in the best possible manner. Cost $4.600 complete. Mr. Henry A. Lambert, architect, Bridgeport, Conn.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A PHILADELPHIA RESIDENCE.

We publish as the subject of one of our plates in colors in this issue a residence, recently erected for Clarence M. Burch, Esq., on Chester Avenue, Philadelphia, Penn. On page 61 we give an additional view of the residence. The dignified exterior of this house is very attractive. It is treated in the Romanesque style of architecture, and it has a tower on the corner and a bay-window on the side, forming a portion of the library and terminating in a balcony outside of the ballroom. The building is constructed of the best materials, in a thorough, workmanlike manner. The floor plans present an arrangement of rooms that is satisfactory. There are a wide (hall 10 feet) extending the entire length of building, both on first and second floors, and an ample veranda that does not exclude the sunlight from any room. The entire building is built of rock-faced Avondale stone, with Indiana limestone trimmings. The roof is covered with Spanish tiles. Dimensions: Front, 46 ft. 6 in.; side, 62 ft., exclusive of front piazza. Height of ceilings: Cellar, 8 ft.; first story, 11 ft.; second, 10 ft.; third, 10 ft. The vestibule floor is laid with marble mosaic. The walls and ceilings are paneled in oak. Hall is trimmed with oak. It has a paneled wainscoting and ceiling beams, forming deep panels. The staircase has a massive carved newel with candelabra. One of the columns extends to ceiling, forming Gothic arches, and is provided with brackets and ornamental spindlework. This staircase is lighted effectively by a massive stained glass window. The fireplace is built of brick, with tiled trimmings and a massive carved mantel with mirror, etc. Reception room is treated in a delicate manner with ivory-white and gold. Parlor and library are trimmed with oak, and each have open fireplaces, furnished with tiled trimmings and hardwood mantels. Dining-room is also trimmed with oak, and it has a ribbed ceiling and a paneled wainscoting. The floors are laid of oak. Butler's pantry is wainscoted and trimmed with oak, and is provided with butler's bowl, drawers, shelves and dressers. Kitchen, trimmed and wainscoted with ash, contains a fireplace for range, sink, dresser, and a stairway to cellar and to second floor. There are five bedrooms, bathroom, servant's bedroom, and billiard room on second floor. These apartments are trimmed with various kinds of hardwood. The floor and walls in bathroom are tiled and furnished complete. Billiard room is trimmed with oak and it has a floor laid with similar wood. The third floor contains a ballroom, 32 feet by 40 feet, with an open trussed roof in hard-oil finish, and a polished oak floor. The tower forms a stall for the orchestra. Cemented cellar contains laundry, furnace and other necessary apartments. All the appointments are of the most modern and elegant description. Messrs. Moses & King, architects, 431 Walnut street, Philadelphia, Penn.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT JOLIET, ILL.

On pages 64 and 65 we present photographic views, specially taken for the SCIENTIFIC AMERICAN, of a very tasteful residence at Joliet, Ill., that of James H. Ferris, Esq., planned and built by J. C. Weece, architect, of Joliet. The plans are excellent. The owner gives us the following particulars: "It is a Western log cabin somewhat improved, for with steam heat and plumbing it cost me about $6,000. The foundation and fireplace are of dark hard heads, pointed with red cement. The logs are white cedar, stained in imitation of red cedar, pointed also with red cement. The second story is stained a light orange yellow; the roof olive green; trimmings very dark green, and the sash dark red. The first floor interior is finished in light antique oak; second, in plain pine, varnished. Floor is Georgia pine, varnished. The third view was taken merely to show up the tower, and I call your attention to it because it is so covered with brush you might not notice it otherwise. I think it is a model tower, architecturally speaking."

A COTTAGE AT GLENBROOK, CONN.

The engravings on page 67 present a residence of low cost, which has been erected for Charles H. White, Esq., at Glenbrook, Conn. Foundation, stone. Underpinning, brick. Exterior walls are clapboarded and painted two shades of light brown, with darker trimmings. Gables covered with octagonal cut shingles. Roof shingled and painted red. Dimensions: Front, 29 ft. 6 in.; side, 38 ft., not including front and rear porches. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The interior throughout is trimmed with whitewood, stained and finished in cherry. Hall contains an ornamental staircase, lighted by a stained glass window. Hall is also lighted by a similar window. Parlor contains a chimney, hearth, and a hardwood mantel. Dining-room is separated by double sliding doors. At the rear of dining-room will be found a den conveniently located, and a large pantry, fitted up with the usual fixtures complete. Kitchen is wainscoted, and it contains a fireplace for range, sink, stairway to cellar and to main landing of front stairs, and a lobby large enough to admit ice-box. There are four bedrooms, dressing-room, and bathroom on second floor, and two bedrooms and ample storage on third floor. Bathroom is wainscoted and furnished replete. Cemented cellar contains furnace, laundry, and other apartments. Cost $3,500 complete. Mr. Edward H. Waterbury, architect, 41 Franklin Street, Stamford, Conn.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT HARTFORD, CONN.

We publish on page 71 views of a very attractive design for a suburban residence which has been recently completed for George H. Barton, Esq., at Hartford, Conn. The house was built to meet certain ideas and requirements, involving peculiar arrangements, thus giving many charming vistas. The underpinning is built of local bluestone. The building above is of wood, with the first story clapboarded and painted olive brown; second and third stories are shingled and stained mahogany color. Roof shingled and painted red. Dimensions: Front, 37 ft.; side, 55 ft., not including front piazza and rear porch. Height of ceiling: Cellar, 7 ft; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. The hall, library and dining-room are trimmed with ash. Hall contains an ornamental staircase, turned out of similar wood. It has a broad landing with a paneled divan, and is lighted by latticed windows. Hardwood floors. Reception room is finished in ivory-white. Library has a window seat, a closet with stationary bowl, and a fireplace trimmed with plain enameled tiles in harmonious colors, incased in woodwork of unique design. This fireplace has a hardwood mantel. Dining-room fireplace is built of red brick from floor to ceiling, and it has a mirror built into same. Kitchen and its apartments are trimmed with whitewood, finished natural, and it is provided with the usual fixtures in a most complete manner. The second floor is trimmed with white pine, and treated in colors in a delicate manner. This floor contains four bedrooms, linen closet and bathroom. Bathroom is wainscoted and furnished replete. Three bedrooms and trunk room on third floor. Cemented cellar contains furnace, laundry and other apartments. Messrs. Hapgood & Hapgood, architects, 141 Trumbull Street, Hartford, Conn.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

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A FLAT HOUSE AT BRIDGEPORT, CONN.

We publish on page 66 a very excellent design for a two-family house, which has been erected for Arthur Randall, Esq., at Bridgeport, Conn. The elevations are pleasing and attractive, and the building has the appearance of a single house, while the interior presents a large number of good-sized rooms, arranged for two families. Each apartment is separate from the other, and is provided with stairways at front and rear. The underpinning is built of local rock-faced bluestone. The first story is clapboarded, and the second and third stories are shingled and painted cream-brown with darker trimmings. Roof covered with octagonal cut slate. Dimensions: Front, 33 ft.; side, 51 ft., net including piazza. Height of ceilings: Cellar, 7 ft. 6 in.; first story, 9 ft. 6 in.; second, 9 ft. 6 in.; third, 8 ft. 6 in. The interior throughout is trimmed with whitewood and is finished natural. The doors and windows have beaded casings and turned angle blocks. The hall contains an ornamental staircase, which is lighted by delicate stained glass windows. The parlors are octagonal in form, and are separated from dining-rooms by double sliding doors. Dining-rooms are provided with hardwood mantels. Kitchens, rear hall, pantries, and bathrooms are wainscoted with narrow beaded stuff, and each are furnished and fitted up in the best possible manner respectively. The third floor contains four bedrooms and ample storage. Cemented cellar contains laundry, furnace, and other necessary apartments. Cost $4,500. Mr. A. H. Beers, architect, Post Building, Bridgeport, Conn.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.



A DWELLING AT BRIDGEPORT, CONN.—See page 62.

ST. PETER'S CHAPEL, SPRINGFIELD, MASS.

The engravings, page 68, present St. Peter's Chapel, recently erected at Springfield, Mass. Its design is a mixture of Gothic and Renaissance architecture. On one corner is the tower and cross, in all fifty-six feet high, while dormer windows and octagonal chancel add beauty to its exterior. The underpinning is built of rock-faced sandstone. The building above is of wood, with shingled sides and roof, handsomely stained. The interior is very neat, and the walls, being tinted in light colors, set off the room to good advantage. The chancel is finished in quartered oak, the furnishings being of the same material. Three beautiful stained glass windows are in the chancel, the gift of Mrs. Jane Burgin. The main room, or auditorium, 36 x 45 ft., extends about three-quarters of the length of the structure, and is lighted by a number of small stained glass windows. It has a seating capacity of 260, but by throwing open its doors into parlors, and the windows into Sunday school room, over 500 could be accommodated. The seats are of black birch, and are not upholstered. The rest of the building is trimmed with whitewood, finished natural. The parlors are well lighted, and are prettily arranged with fireplaces, ornamented with tiling and furnished with mantels of excellent design. The Sunday school room over has a fireplace and is fitted up replete. In the small wing near the chancel are the organ chamber, robing-room and study. The cellar contains furnace room and a kitchen, fitted up complete, besides other necessary apartments. Cost, $7,100 complete, exclusive of furnace and furnishings. Mr. W. P. Wentworth, architect, Boston, Mass.

Our engravings were made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

CITY DWELLINGS, WASHINGTON HEIGHTS, NEW YORK CITY.

On page 69 will be found an engraving showing some dwellings, of modern design, which have been erected on Washington Heights, New York City, N. Y. They are all of different dimensions, contain a various number of rooms, and no two dwellings are built after the same design or of the same kind of material. The construction is of the most substantial character, the materials of the best quality, and the workmanship unsurpassed. We present, with the engraving, floor plans and description of the end house, owned by O. Curtiss Hoffman, Esq. The first story and balustrade to porch are built of rock-faced granite, with dressed stone trimmings. The superstructure above is built of Milwaukee brick, with limestone trimmings. Roof is covered with red English tiling, and is finished with a terra-cotta cresting and a dragon finial. Dimensions: Front, 22 ft.; side, 60 ft., exclusive of front porch. Height of ceilings: Cellar, 8 ft.; first story, 10 ft. 6 in.; second, 9 ft. 6 in.; third, 8 ft. 6 in. The interior is planned with a view to combine convenience with elegance, and is treated in the Old Colonial style. The vestibule walls and ceiling are paneled, and the floor is laid in marble mosaic. The main hall is trimmed with antique oak, and the floor is laid in parquetry. The stairway stands well back in the hall, and is provided with a massive carved newel. The parlor is treated in ivory white, and the library in china white and gold. The parlor has a carved mantel, made from a special design. The fireplace is built of brick, with facings of Mexican onyx and a hearth of tiles. The dining-room, spacious, is trimmed with antique oak. It has a paneled wainscoting and ceiling beams. The buffet, built in from special design, is handsomely carved, and provided with fluted columns. The fireplace is furnished with tiled hearth and facings, and a mantel to correspond with buffet. Butler's pantry is trimmed with ash, and is fitted up with dresser, cupboard, drawers, bowl, and dumb-waiter. The second floor is trimmed with antique oak, and contains two large bedrooms, ample closet room, and bathroom, the latter having a floor laid in mosaic, and a wainscoting of white English tiling. It is fitted up complete. Exposed plumbing. The third floor is trimmed with cherry. It contains four bedrooms, and trunk room provided with servant's bathtub. The fireplaces are furnished with tiles and grates. Basement contains kitchen, laundry and pantries, provided with the usual fixtures complete. The front basement, or cellar, contains laundry and other necessary apartments. Mr. William E. Mowbray, architect, New York City, N. Y.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

CORRECTION.—Stilson and Brown, New Haven, Conn. were the architects of the New Haven house pictured in our October number, not Wilson and Brown.

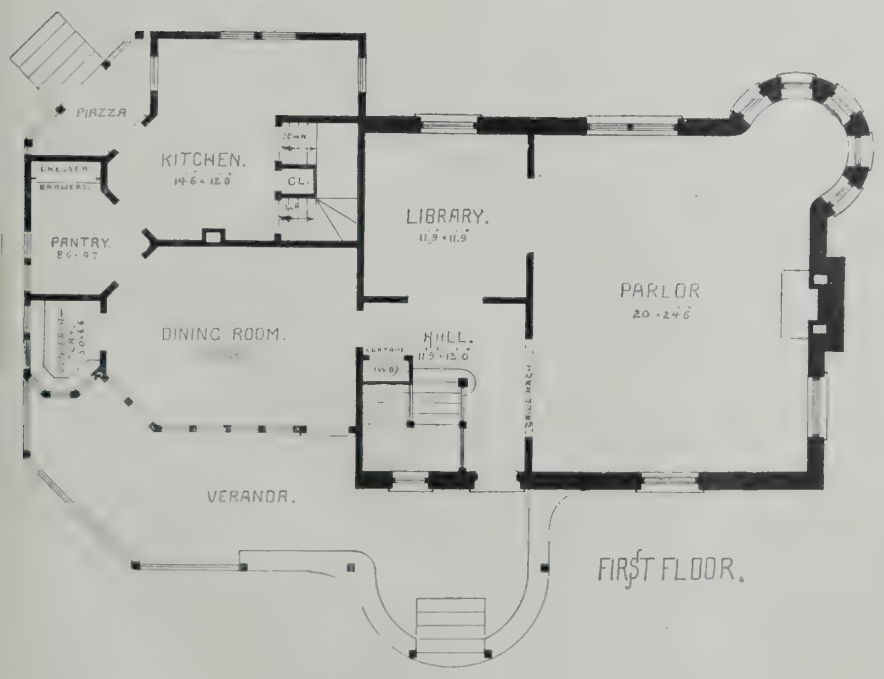
FOR what is the greatest amount of lumber used? Nine people out of ten will say for houses and buildings. It is doubtful if 35 per cent. of the lumber output goes into buildings. The railroads, farmers, and miscellaneous purposes take about 40 per cent., and the other 20 per cent. goes into boxes. This estimate is made, says the *Southern Lumberman*, on the judgment of some of the oldest and best informed lumbermen in the country.

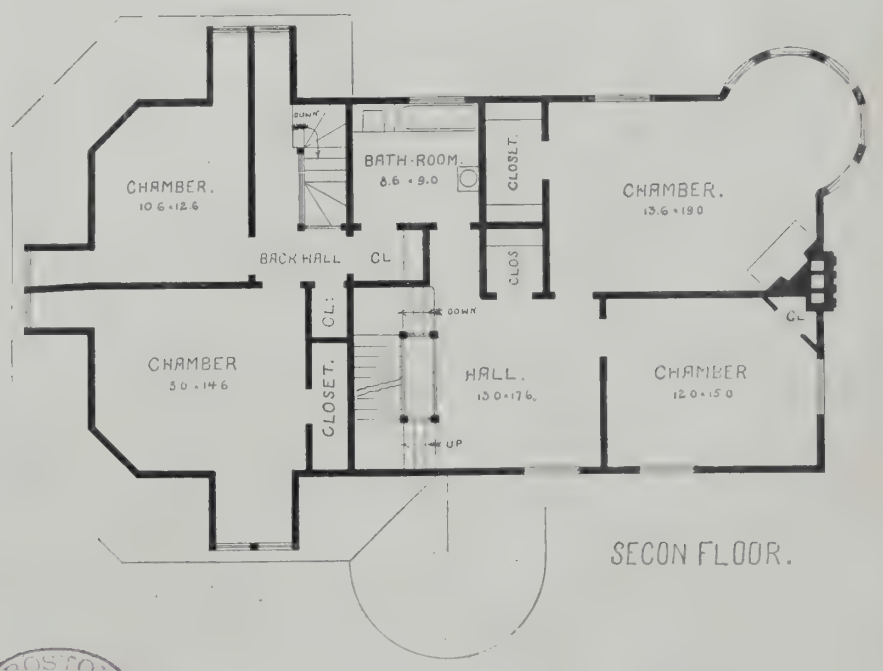


A RESIDENCE AT JOLIET ILL.

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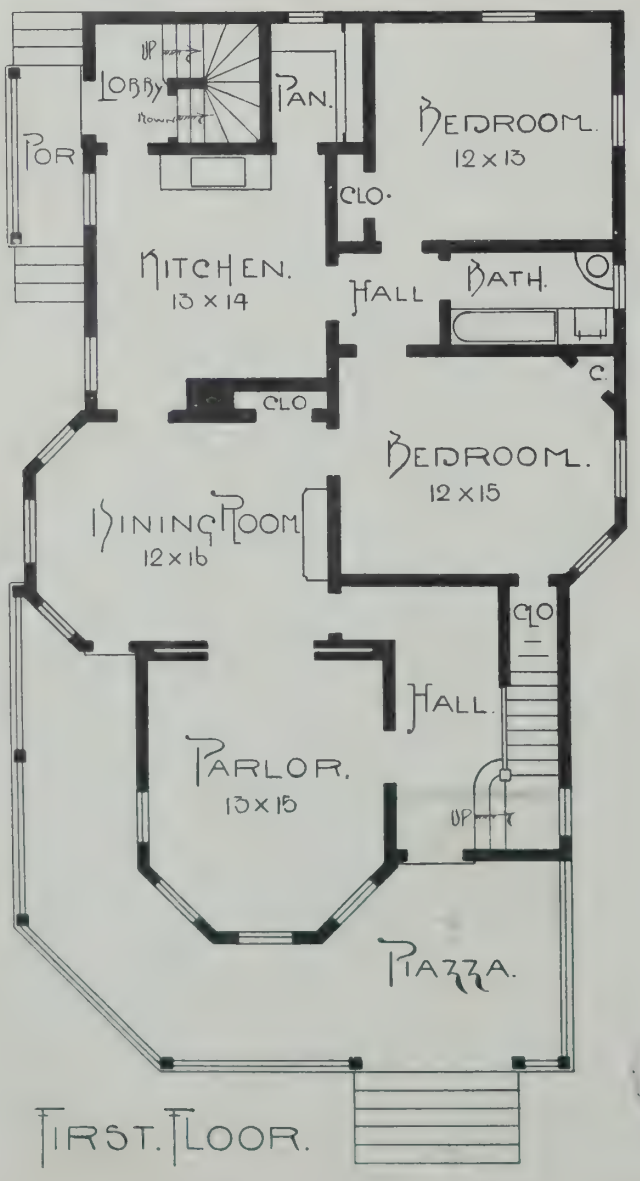




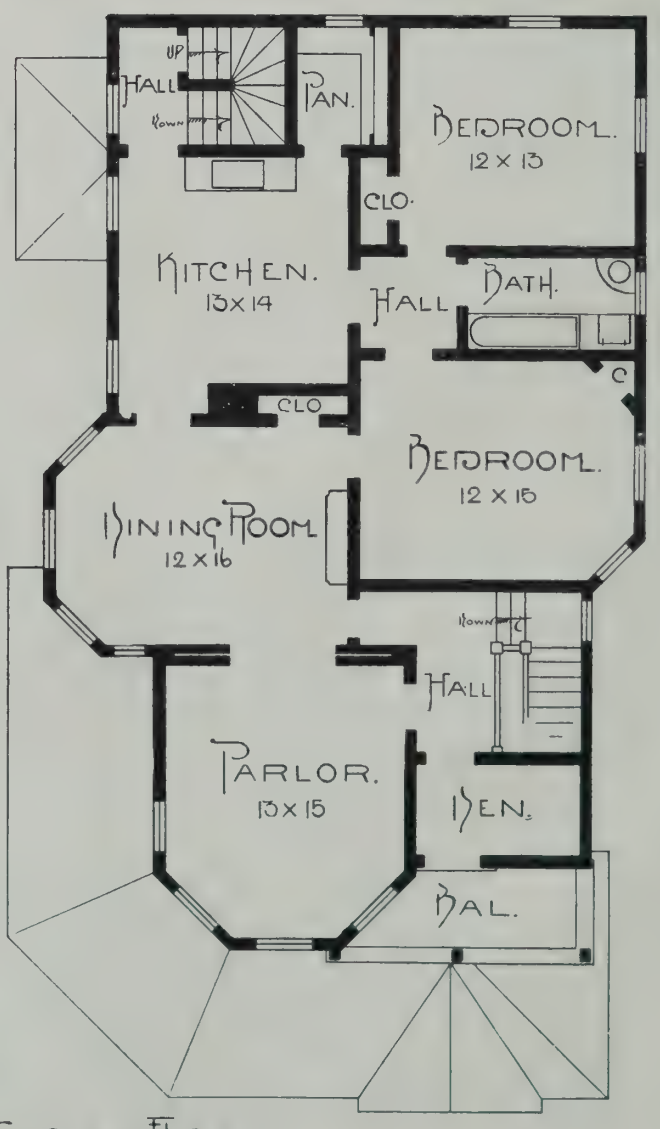
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A RESIDENCE AT JOLIET, ILL.—See page 62.





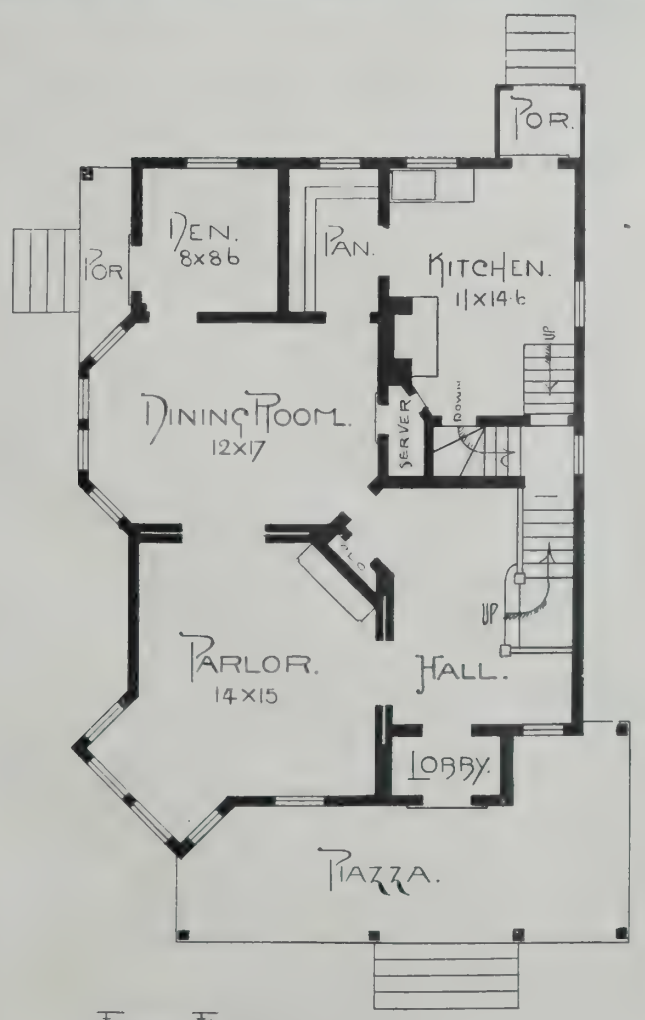
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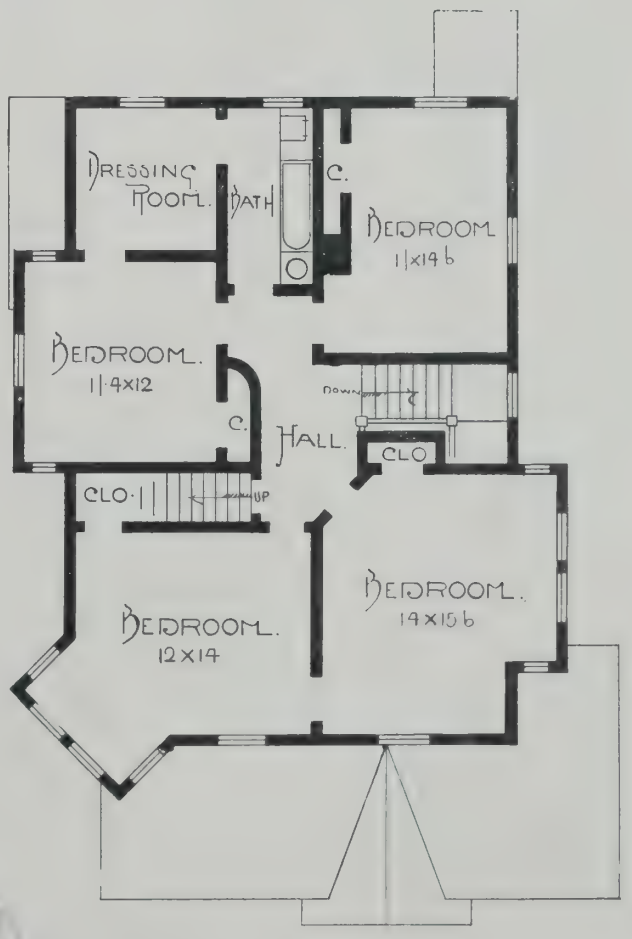
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A FLAT HOUSE AT BRIDGEPORT, CONN.—See page 63.



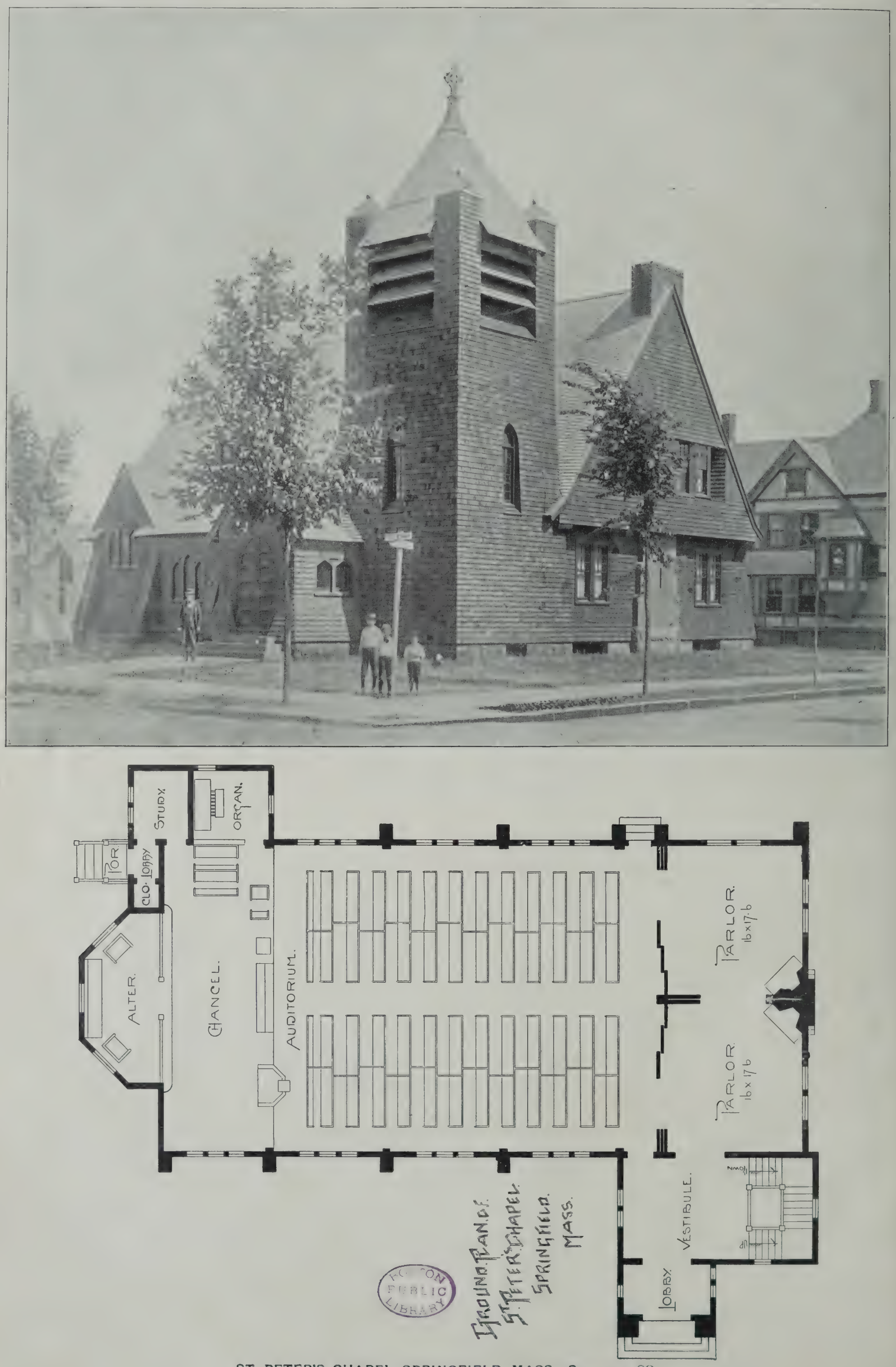


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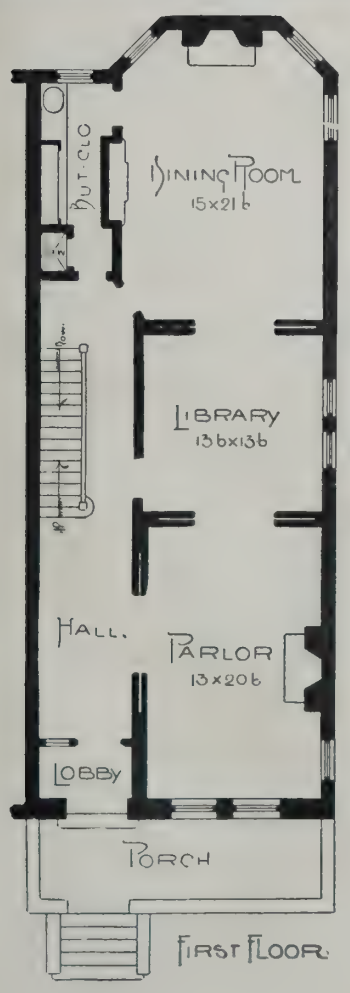
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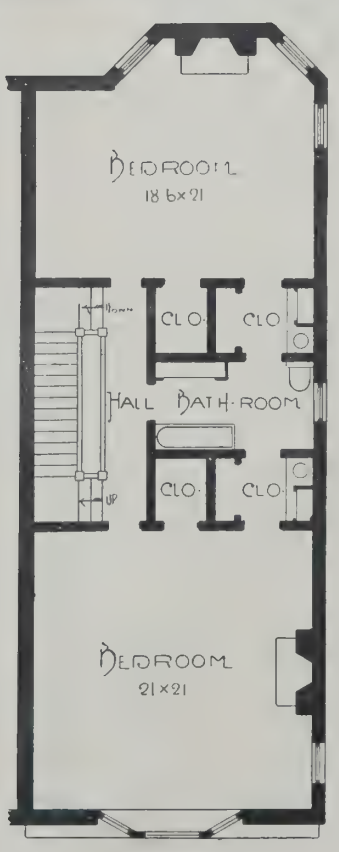
A COTTAGE AT GLENBROOK, CONN. See page 62.

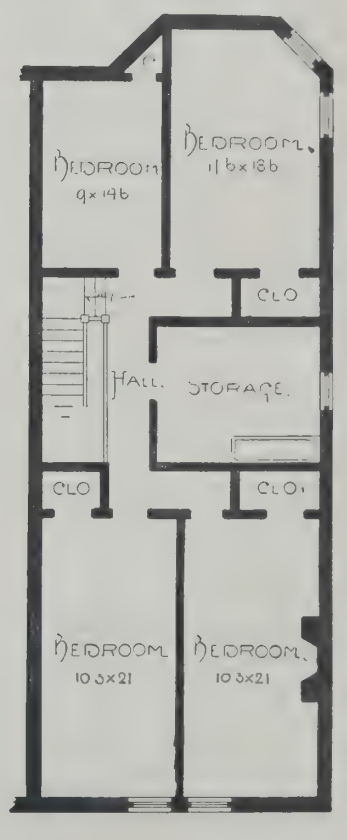


ST. PETER'S CHAPEL, SPRINGFIELD, MASS.—See page 63.



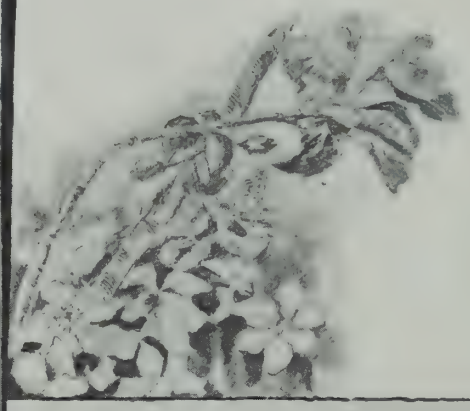






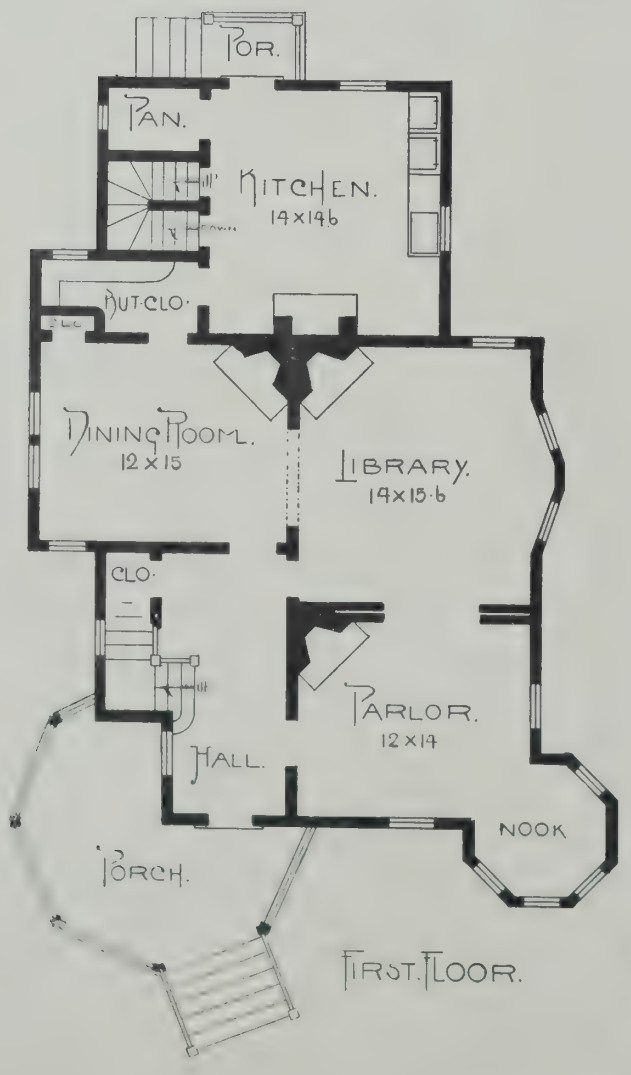
CITY DWELLINGS, WASHINGTON HEIGHTS, NEW YORK CITY.—See page 63.

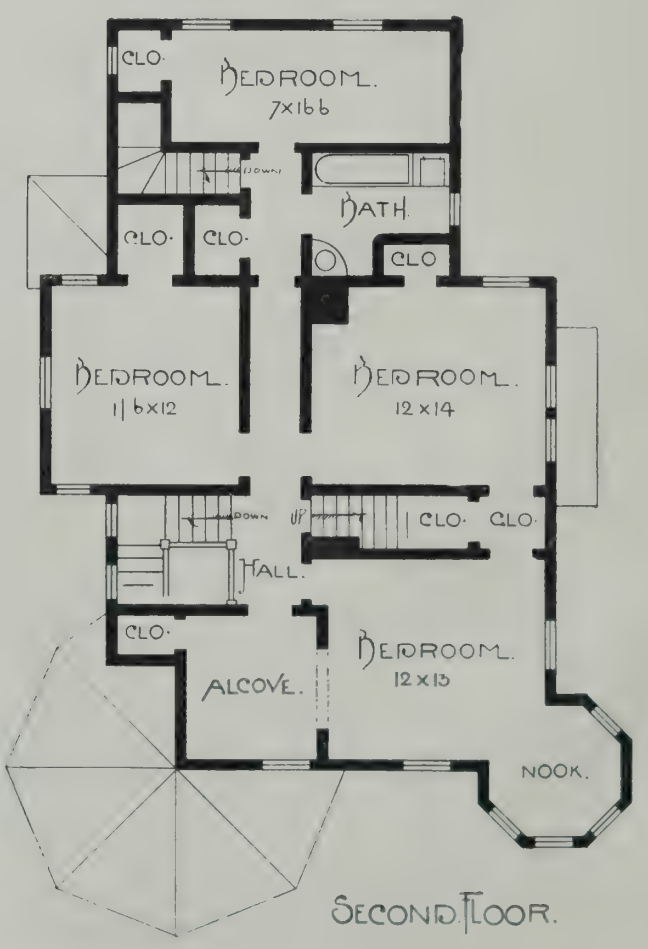




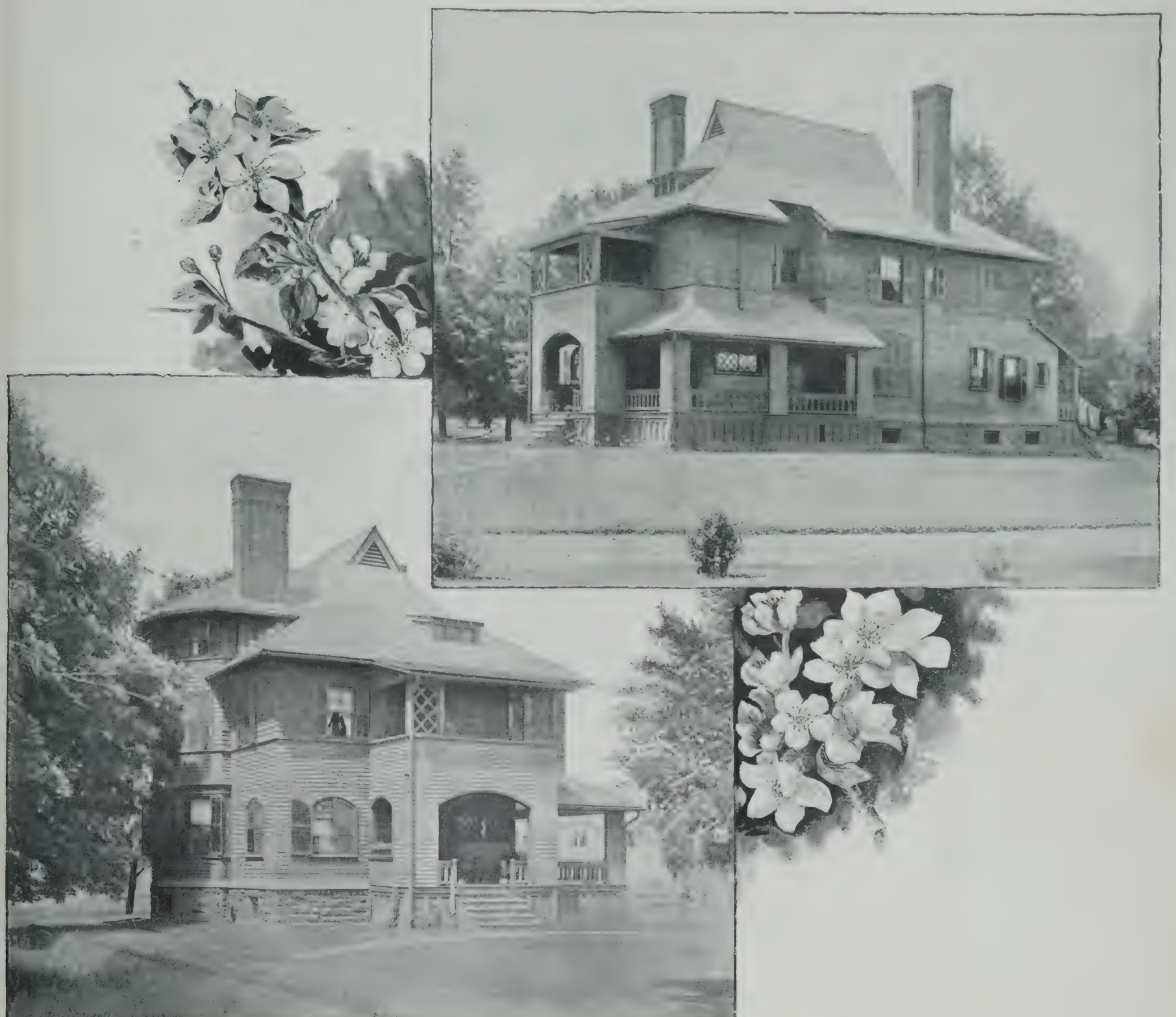


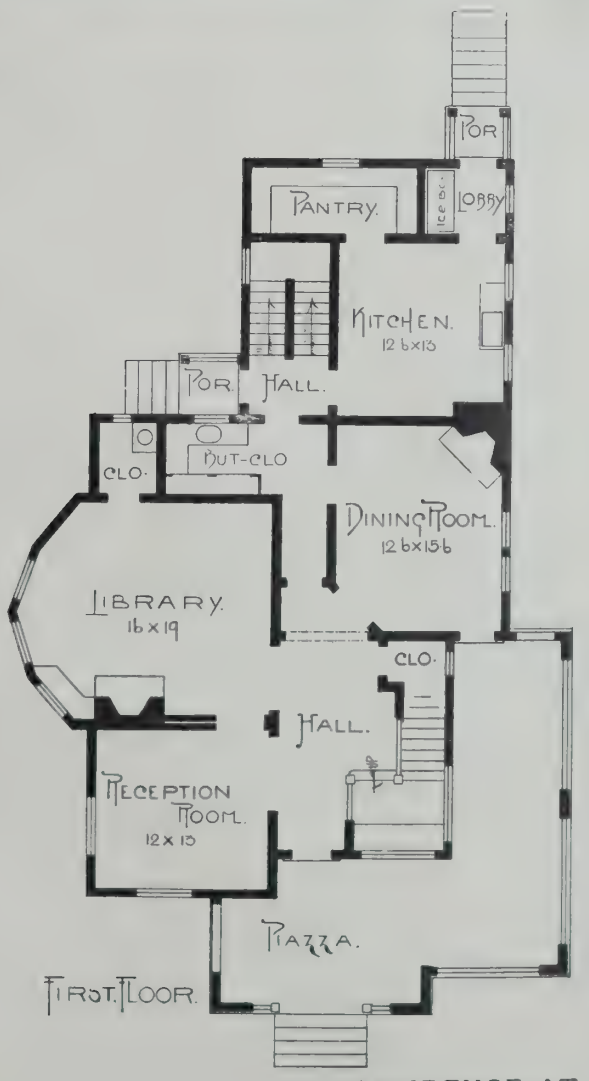


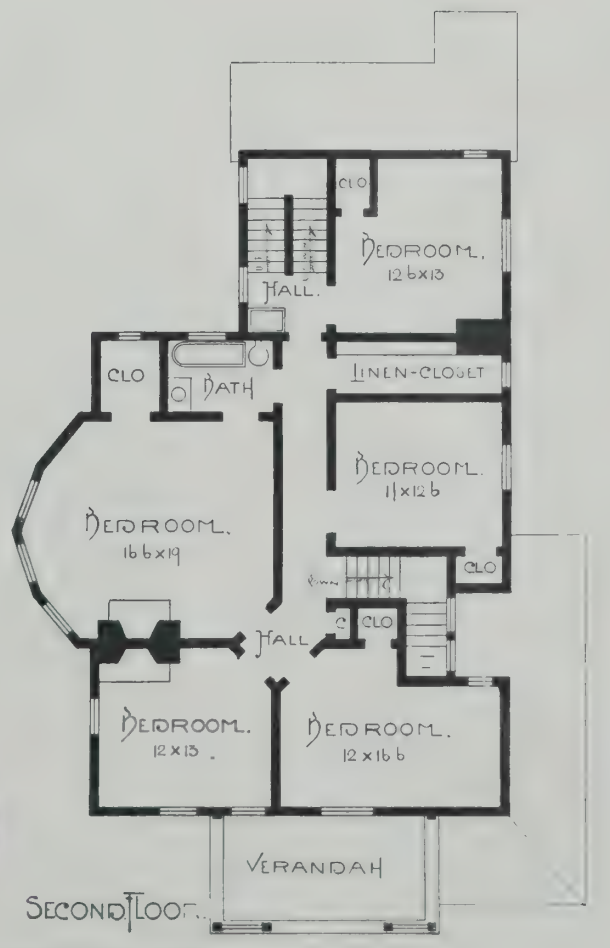




A DWELLING AT GLENBROOK, CONN.—See page 72.







B.C. PUBLIC LIBRARY

A RESIDENCE AT HARTFORD, CONN.—See page 62.

A DWELLING AT GLENBROOK, CONN.

The engravings and plans published on page 70 present a residence recently erected for C. T. Hemstead, Esq., at Glenbrook, Conn. The elevations are pleasing and the plans are excellent. The interior is fitted up in a most complete manner. The underpinning is built of local stone, and the building above is of wood, with exterior walls sheathed, clapboarded, and painted light olive-green with bottle-green trimmings. Roof shingled and painted red. Dimensions: Front, 32 ft.; side, 44 ft. 6 in., not including front porch. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. The interior throughout is trimmed with whitewood. Hall, parlor and library are stained and finished in cherry. Hall contains an ornamental staircase with massive newel posts. This hall and staircase are lighted by windows glazed with delicate tinted glass. Parlor and library have open fireplaces, built of brick and furnished with tiled hearths and facings and hardwood mantels. The fireplace in dining-room is also built of brick, and it has a hearth and facings of similar brick and an oak mantel. Kitchen and its apartments are wainscoted with narrow beaded stuff, and they are fitted up with all the necessary fixtures in a most complete manner. There are four bedrooms, alcove and bathroom on second floor, and two bedrooms and ample storage on third story. Bathroom is wainscoted and furnished replete. Cemented cellar contains furnace and other necessary apartments.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

MOVING OF A LARGE MASONRY BUILDING IN CHICAGO.

The Normandy Apartment building, formerly standing at Nos. 116, 118, 120, and 122 Laflin Street, Chicago, Ill., which has been moved to Van Buren Street, for the Metropolitan Elevated Railroad Company, is supposed to be the largest building ever moved and turned around on rollers. (See Fig. 4.)

The building was moved east 200 feet, then turned around to a north front, and moved north to the new

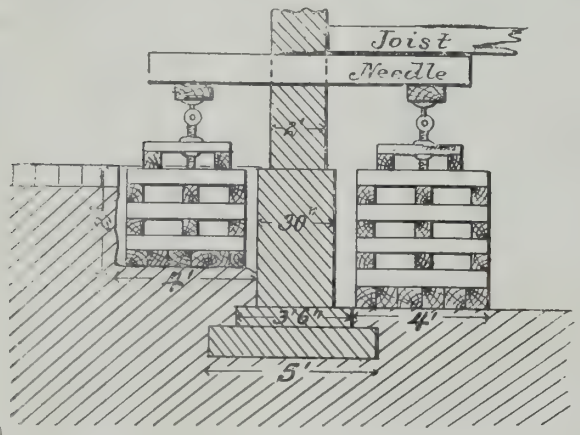


Fig. 1

BEFORE RAISING.

foundation about 150 feet more, making a total distance of 350 feet, without counting the turn. The dimensions of the building are 94 x 84 ft., built of brick, with a gray granite front and terra cotta trimmings.

Weight about 8,000 pounds. Twenty-four men were employed about ten weeks to complete the work of removing the building from the old to the new foundation. Eight hundred jackscrews were required to raise the building, and 600 rollers were used in the moving.

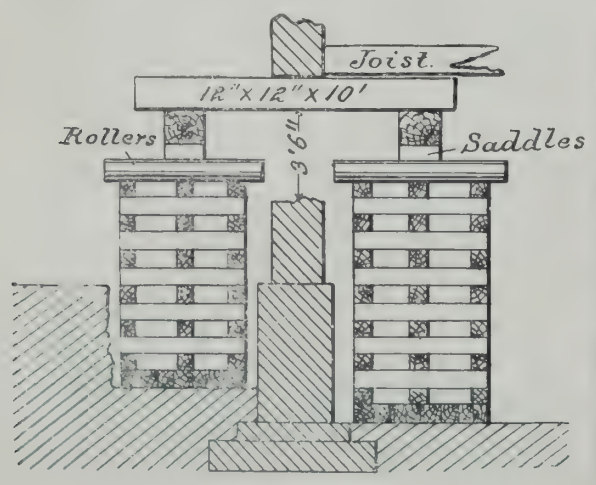


Fig. 2.

AFTER RAISING.

The details of the mode of moving and supporting the building are as follows: A trench 4 feet wide and 2 feet deep was excavated all around the outside wall, so as to give room to place the necessary blocking, as in Fig 1. Cribs were built on both sides of each wall, and jackscrews placed in position on these cribs of timber benches, as close together as they could be crowded. Cap timbers were then placed on top of these screws lengthwise of the building, care being taken that the inside and outside cap timbers were on the same level.

Holes were then cut through the wall on a level with the top of the cap timbers on needles; 12 x 12 x 10 ft. timbers were run through the wall, each end resting on a cap timber with the wall in the centre; the holes were cut on an average of 2 feet from centre to centre of each needle.

All around the building, at intervals of every 12 feet, long timbers were run clear through the building, so as to make a cross binder or tie for all the cap timbers.

After the needles and timbers were all in place, they were all keyed up with wedges of the proper taper to fit the opening on top of the needles between the wall.

The screws were then divided between the men so that each man had on an average ten screws to turn; the signal to turn was given with a whistle, by the foreman, whose business it was to see that each man should take one turn each time the whistle sounded.

The screws were tightened up in this way till the wall began to separate from the foundation, when all the men releveled the cribs to get them in perfect level before starting to raise again. The building in this way was raised 3 ft. 6 in., which was the height required for placing the rollers. (See Fig 2.) 6 by 6 blocking was placed across the cribs, and 4 by 5 hickory skids were laid lengthwise of the building, and the rollers placed on top of these. The rollers were hard maple, 8 inches in diameter and 4 ft. 8 in. long.

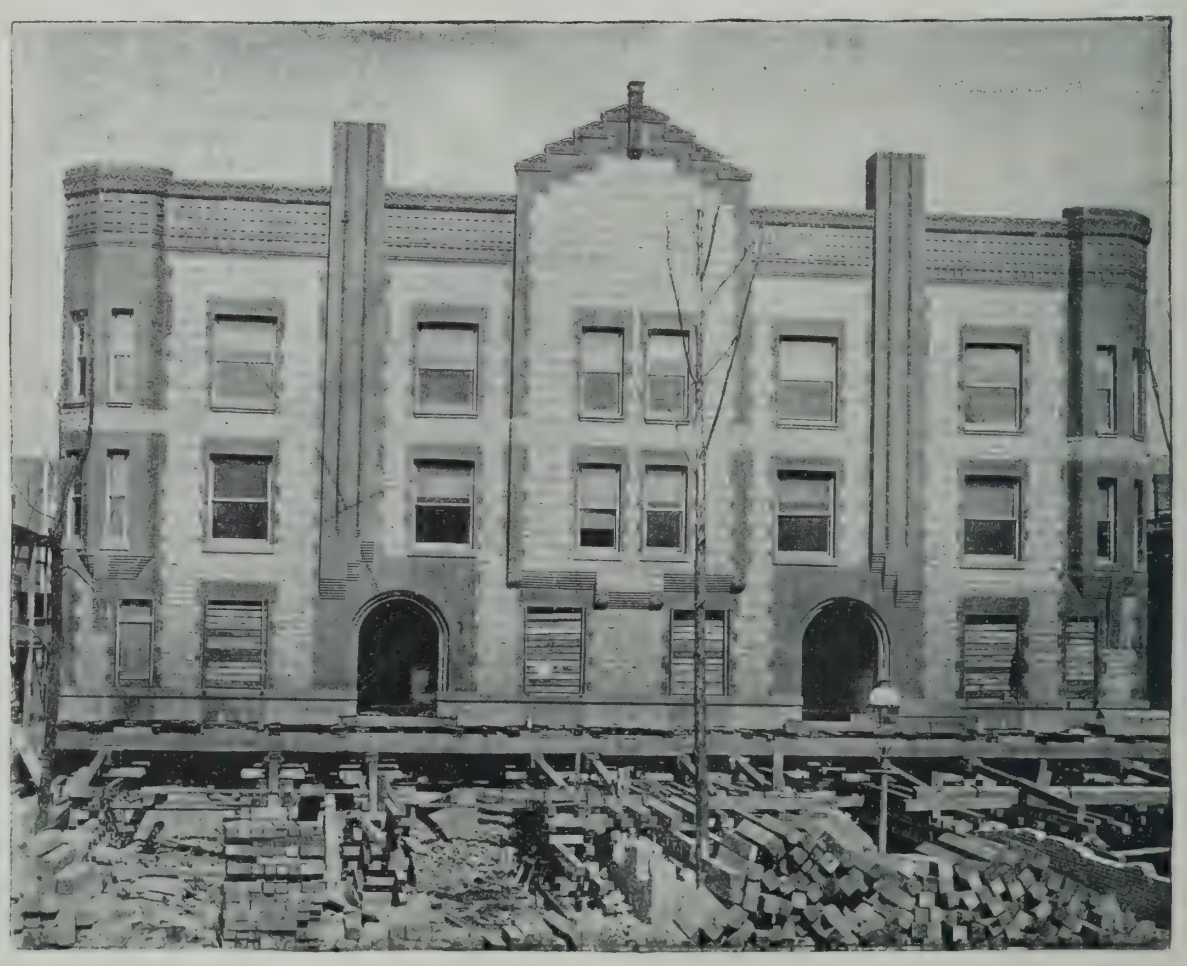
Saddles were then placed between the top of the rollers and the bottom of the saddles (4 in. by 12 in. by 6 ft. oak), and the intervening space then wedged up tight, and the screws then slacked out and removed.

The building was then ready for moving. We give photographic cuts showing the appearance of the building, front and rear, after the rollers had been inserted.



THE NORMANDY APARTMENT BUILDING.—Rear View.

Jackscrews 7 feet long were used to push the building back to the turntable, 200 feet east. The turntable was a level mass of timber work, 132 by 132 ft. square and 4 ft. deep, built of 200,000 feet of 6 by 6 timbers, laid on ground that had been thoroughly scraped and brought to a level. The ground was sprinkled with sand, and then paved with plank laid closely together. The framework of timber was then built on this foundation, and again thoroughly leveled, a surveyor's instrument being used in the work. The framework of 6 by 6 timber was then covered with 4 by 5 hickory skids, 12 ft. long by 3⅞ in. thick, which made a smooth and level floor, 132 by 132 ft. (See Fig. 2.)



THE NORMANDY APARTMENT BUILDING.—Front View.

The building was propelled on to this floor, and the rollers pointed to the centre of the building, where a pivot had been placed, around which the building revolved.

Fig. 3 shows the plan of the timberwork supporting the building; the black lines are the timberwork, and

the dotted lines the outline of the building. The building, as explained before, was revolved around to the proper position on the turntable, and, when the building was at a proper angle, the rollers were straightened up, and the building was pushed forward (north) to a new foundation of cribbing, previously built to receive it,

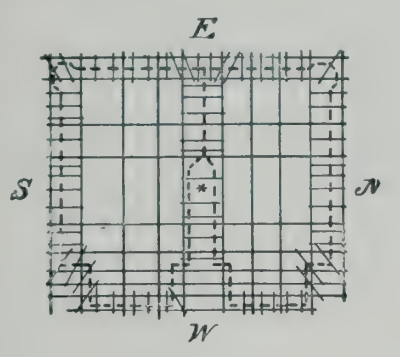


Fig. 3.

Timbers running east and west are cap timbers. Timbers north and south, cross timbers Short lines are needles. * Pivot; axis of building.

screws again set in place, the building raised enough to remove the rollers, the rollers, saddles, and skids removed, the screws slacked as much as they were previously raised (3 ft. 6 in.), and the building lowered down to the same height on the new foundation as it was before it was disturbed.

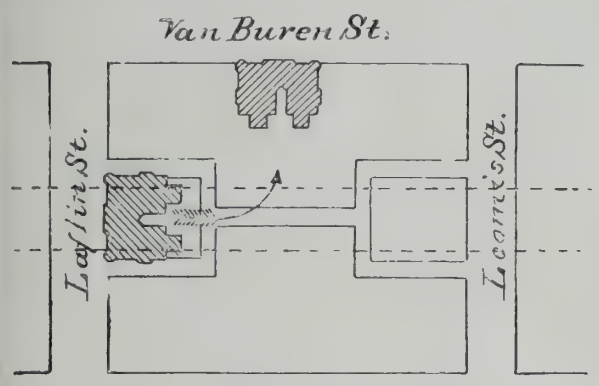


Fig. 4.

The foundations then carried up between the timbers and thoroughly wedged, the timbers then taken out, and the building soon ready for occupancy.

This notable work was executed by L. P. Friestedt, of Chicago, who is well known as an experienced and successful architectural engineer.

Causes of Fire in Dwellings.

The *Journal* of the Franklin Institute provides an interesting paper upon the "Causes of Fire in Dwellings," in which the author attributes them chiefly to heating and lighting apparatus. Statistics on the causes of fires have been very meagre. Strict cleanliness in heating arrangements is urged, as fires are often produced by accumulation of dust and fine organic matter, and before "firing up" in the autumn it is recommended that the entire apparatus be thoroughly examined. Ashes retain heat for a long time, and, when seemingly cooled, should not be placed in wooden barrels or near frame buildings. Gas fixtures should not be so fixed as to be capable of swinging against combustible substances, such as curtains and woodwork, but should be provided with stops to obviate such danger. Another point often overlooked is that, if a window be opened near a gas burner, a draught may blow a lace curtain into the flame, and a fire results. The author argues that woodwork near stoves should be protected with bright tin, which acts as a reflector to the heat rays, while a black or rough surface absorbs them. Also, that while brick platforms are not so safe as tin, because stoves are not apt to remain as stable upon brick as upon metal, brick arches are the proper means to adopt to protect flooring, and that if brick arches cannot be obtained, then a layer of thick asbestos paper or concrete should be first laid on the woodwork, upon this a layer of sand and concrete, and then bricks laid in good cement, upon which another layer of bricks should be laid, but in such a manner as to leave an air space between it and the preceding course. The safest system of heating, however, he considers to be by hot water, with pipes fixed free from any woodwork. The reason why steam pipes ignite wood he asserts to be twofold—(1) by allowing the water to run low the steam becomes superheated, causing a true combustion, and (2) pipes containing steam at the usual temperature may cause the secondary phenomenon of spontaneous combustion. In the latter case, the steam pipes slowly dry the wood, the contained moisture being vaporized, and at last the wood assumes a state resembling charcoal, whereupon the glowing or combustion well known in the case of charcoal takes place spontaneously.—*The Builder.*

THE WORLD'S COLUMBIAN EXHIBITION: A GENERAL VIEW.*



The exhibition held this summer in honor of the four hundredth anniversary of the discovery of the American continent by Columbus was naturally of the greatest interest to architects all over the world; for herein are contained the efforts of the best known and most distinguished of the American architects, and it is in consequence a gauge of the standard of American contemporary architecture. On February 24, 1890, Congress finally decided in favor of Chicago. Jackson Park, a large tract of land two and one-half miles in length, running north and south, and having an area of some seven hundred acres, situated to the southeast of the city, and bounded on the east by Lake Michigan itself, was selected. Mr. Fred[illegible] Law Olmsted was given the commission of arranging the grounds, and he showed great skill and tas[illegible] into a really [illegible]

A council of selected architects [illegible] number, five from New York and the East, and five from the West of America, principally from Chicago. Richard M. Hunt, of New York, the Nestor of the architectural profession in the States, by common consent was given what was considered the most important design, and which was to form what would really be the great entrance portal of the Exhibition, viz., the Administration building. To the New York architects was appointed the principal building abutting on the great Court of Honor running west from the Administration building to the lake. The Machinery Hall was given to Messrs. Peabody & Stearns, of Boston; the Agricultural Hall, to Messrs. McKim, Mead & White, of New York; the Manufactures building, to Mr. Geo. B. Post, of New York; the Electricity building, to Messrs. Van Brunt & Home; and the Mines building, to Mr. S. S. Beman, of Chicago.

To the Western architects were given the buildings surrounding the northern picturesquely treated lagoon, which has an island in the centre, rustically treated in an irregular manner, and which is quite independent and different in that respect to the grand Court of Honor on the south, which is architecturally treated and formal in its character. The Transportation building was allotted to Messrs. Adler & Sullivan, well known in connection with steel frame buildings in Chicago: the Horticultural building, to Messrs. Jenney & Mundie, of Chicago; the Fisheries building, to Mr. Henry Ives Cobb, of Chicago; and the Art building, to Mr. C. B. Atwood, of Chicago. Mr. Daniel H. Burnham, as the Chief of Construction, was responsible for the carrying out of the designs in their entirety. Mr. Burnham took up his residence on the grounds in the early part of 1891, and organized his staff, and the buildings were carried out by him with every deference to the architects' wishes in relation to their designs. Mr. C. B. Atwood, of Chicago, was appointed designer-in-chief to the Exhibition.

The Peristyle, by Mr. Atwood, has its Corinthian columns arranged four deep, forming three passages, the central one being fifteen feet wide, and the outer ones narrower, the whole conception being founded on Bernini's colonnades in front of St. Peter's at Rome, with the exception that here it is straight on plan. The columns, twenty-four in number on each side of the central arch, symbolize the States and Territories of the United States, and the names are carved in the frieze above. In the centre is a triumphal arch.

* Abstract from the *Builder*, London.

On the north shore of the North Pond is the classically designed Art Palace, by Mr. C. B. Atwood, of Chicago, The main entrance faces north toward the city, and on either side are two wings covered with small domes. The central portion is covered with a well-proportioned dome, surmounted by a figure.

The buildings throughout were constructed, as to their façades, with wooden frames covered with "staff," a material which has been in use in France (and in England is known as fibrous plaster) for exterior purposes, and which is a fibrous plaster composed of Portland cement, plaster of Paris, and hemp fiber; this is cast into moulds and nailed to laths. It is a material which lends itself readily to the needs of the situation in being comparatively cheap, easy of manipulation, and producing an effect which is all that can be desired for a temporary structure and its sculpture.

The Administration building, by Mr. Hunt, President of the American Institute of Architects, is, from an architectural point of view, probably the most important building on the grounds. The area given to Mr. Hunt was a square of 260 ft., and on this he projected a structure, the centre of which is an octagon carried up into an octagonal dome, whose internal diameter is 120 ft., and internal height 220 ft., and external height 275 ft. It will thus be seen that the dome on plan is 12 ft. wider than that of St. Paul's, London, that the height of the interior dome is 20 ft. lower, and that of the exterior about the same as our metropolitan cathedral, not, of course, including the lantern. Round this inner octagon is placed an outer one, about 24 ft. deep, the space between on the diagonal side being occupied by staircases and lifts, and on the entrance sides by the vestibules and colonnades. On the diagonal sides are four pavilions, 84 ft. square and four stories in height.

Machinery Hall has a frontage of 840 ft. on the Great Court, and 500 ft. to the South Canal. It is by Messrs. Peabody & Stearns, of Boston. To give an idea of the extent of the structure, it may be mentioned that in comparison with the Houses of Parliament at Westminster, it stands in the relation of five to two as to superficial area. The treatment reminds one somewhat of Perrault's colonnade at the Louvre, in Paris. The central *motif* in each façade takes up, with the two towers, the width of the nave of 130 ft. wide, which is thus truthfully expressed externally. In order not to form too strong a contrast at the angles, and to bring these pavilions into relation with the screen wall, the Corinthian colonnade is continued round these, being slightly projected in front, and thus gaining a shadow effect. These pavilions are crowned by circular domes raised on a circular drum, pierced with semicircular headed windows, which light the interior glazed dome, the outer dome being crowned with a lantern, bringing the whole height of these up to [illegible] Upon the towers are raised very elegantly de[illegible] Renaissance lines.

Mead &

being pla[illegible]

which faces it on the west[illegible] building, an annex on the southern side of 550 feet by [illegible] feet. The main building consists primarily of two central naves, 95 feet wide, crossing one another at right angles on the longer and shorter axes of the building. These are roofed with trusses of very light construction, in this respect differing from the well-designed trusses of the Machinery Hall opposite, which, it will be remembered, were built so that they could be sold for railway stations at the end of the Exhibition. The construction of the roofs to the Agricultural building is a composite one, wood entering largely into the design; the height of the central nave is 75 feet, and the lantern, which runs from end to end of these naves, is made entirely of wood. On the centre of the main front facing on the great basin, and emphasizing the main nave running north and south, is placed a dome, 78 feet in diameter and 130 feet high, surrounded internally on the ground floor with Corinthian columns of the same height as the main external order and placed in pairs. The *motif* of the façade consists of a Corinthian order of 50 feet high, without pedestals, supporting an entablature, 10 feet high. The central pavilion on the north front has eight pilasters, the four central ones having Corinthian columns in front, which are carried up with a small attic with figures, and crowned with a pediment. The proportions of the whole are good, and the general setting out of the elevation, so as to emphasize certain features in the plan, seems very well thought out.

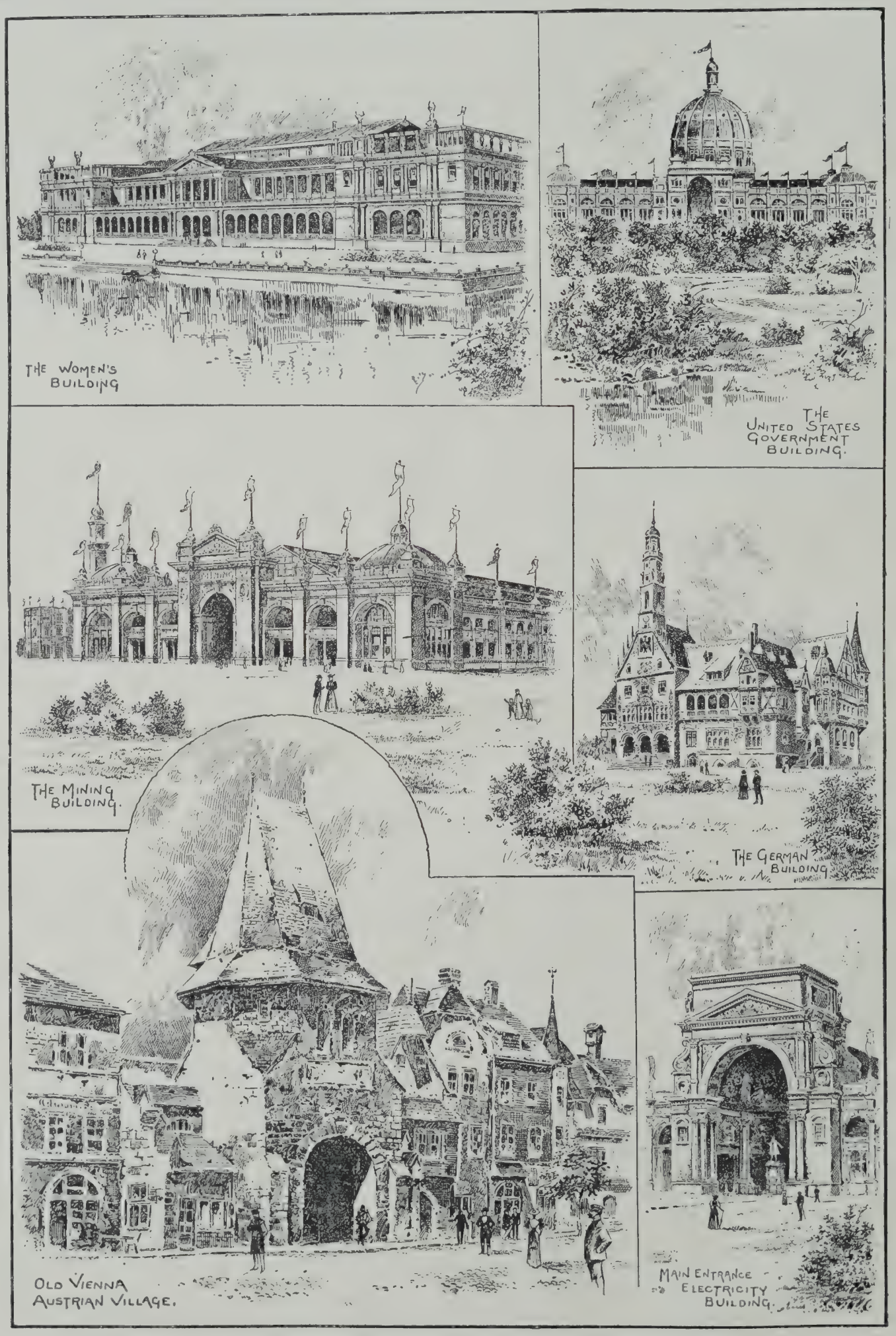
The Manufactures and Liberal Arts building, erected from the designs of Mr. Geo. B. Post, of New York, is by far the largest in the Exhibition, and from a constructive point of view the most important. It is the largest covered structure in the world, and occupies a space of 30½ acres.

The southern façade, which has a length of 787 ft., occupies a space immediately opposite the Agricultural building, on the other side of the grand basin, while the main or longer axis runs north and south for a length of 1,687 ft., and extends into the northern portion of the grounds toward the United States Government building; it is bounded on the west by the wooded lake. Mr. Post, in making his ground plan, surrounded his area with a continuous building, consisting of a nave and two aisles, in all about 200 ft. wide.

The great trusses are spaced on centres of 50 ft., while those to the great roof at Paris were spaced 70 ft. 6 in. apart, centre to centre, and the lattice framing is brought to a point at the base and rests on a steel pin. A similar pin is also used as a connection at the top of the truss, the height of which is 206 ft., and to the top of the ventilating lantern 245 ft. 6 in., or 61 ft. higher than the Paris example. The roof is hipped at each end, and is covered with a lantern the whole length and round the hips. The trusses near the bottom are 14 ft. in width and 2 ft. 4 in. on face, while toward the top they are narrowed to 10 ft. At the point where the huge hip trusses come, they are varied to suit the sweep of the roof, the scriptions, while the central arch, of much greater width, is taken high above, and the whole is crowned with an entablature and a low attic. In front of the piers supporting the arches are colossal Corinthian columns, around which breaks the cornice, and which are emphasized above with statuary and flag poles.

The Electricity building, designed by Messrs. Van Brunt & Howe, of Kansas City, is placed on a site which has a frontage of 350 ft. to the great court, and whose major axis has a length of 700 ft. running north and south. The plan of the building is divided up into 23 ft. bays, corresponding with the interior supports to the galleries. The general scheme consists of a nave, 115 ft. wide and its major axis running north and south, the southern façade facing the central court. It occupies an area of 350 ft. by 700 ft., and is principally interesting in that the cantilever system, so generally employed in bridge construction, has been employed here in the construction of the roof to the main nave and aisles. It is the only example of this in the Exhibition, and it is said to be the first application of this ancient principle of construction for the purpose of supporting a roof covering, at any rate on so large a scale.

The Transportation building, by Messrs. Adler & Sullivan, of Chicago, is in many respects the most remarkable and interesting on the grounds. The building is 960 ft.



SKETCHES AT THE WORLD'S COLUMBIAN EXPOSITION.

four corner trusses which, when taken up, become the hip, being set diagonally on plan. The outer flange of the trusses goes up vertically for a height of 100 ft., and the trusses up to this point are connected by three pairs of horizontal trussed girders, and above by lattice framed purlins on which the light open rafters rest. The central feature in each façade, of about double the width, is composed of a three-arched opening, somewhat similar in arrangement to the arch of Constantine at Rome, the lower arches on each side being the same as those of the openings in the curtain walls, thus helping to blend these with the central *motif*. Above the smaller arches are in-

of about the same height, crossed at right angles in the centre by another nave of the same proportions The trusses are composed of a light iron framework of steel, the upper part being semicircular in the outline, the trusses being composed of inner and outer members, and connected by lattice bracing; at the base the standards are brought to a point and rest on a steel pin. The back members of the standard are taken up above the aisle roof, and have clearstory windows formed in this portion, while the lower portion of the roof is filled with glazing.

The Mining building, by S. S. Beman, of Chicago, is situated to the west of the Electricity building, and has

by 250 ft., and consists of a main nave, 96 ft. wide, around which are placed two-storied aisles. The nave walls are carried high above these aisles, and contain clearstory windows, lighting the nave and giving sufficient light for large exhibits, such as balloons and the like, which are illustrative of transportation. In the centre of the east façade is the great semicircular archway, with receding planes elaborately carved, and which is known as the Golden Gateway; it is 100 feet wide and 70 feet high, and has a square projecting cornice raised above that to the aisle.

(To be Continued.)

AN IMPROVED BRACE.

The Holt Manufacturing Company, of Hartford, Conn., have recently placed on the market a new brace made under patents issued to H. V. Smith, that seems bound to revolutionize all previous ideas of braces. The square shank was the first thought for bits, and, although great improvements have been made in braces for holding them, still it is evident to any one who examines this that it is a marked improvement on any now on the market.



FIG. 1.



FIG. 2.

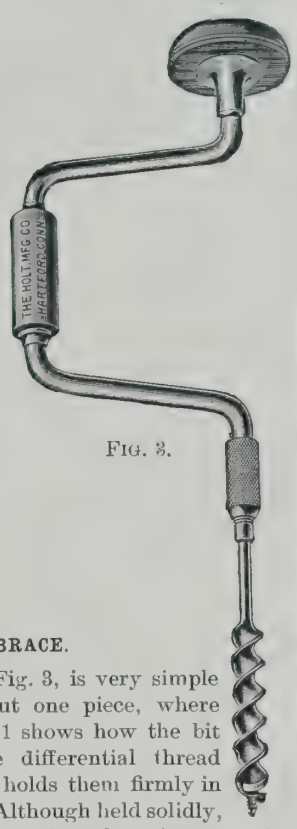


FIG. 3.

THE SMITH BRACE.

This brace, as shown in Fig. 3, is very simple in construction, and has but one piece, where others have several. Fig. 1 shows how the bit and brace are united: the differential thread draws them together, and holds them firmly in place and perfectly in line. Although held solidly, the parts can be as quickly released as in any other brace. They are held by the V as shown in the cut, and tests have shown that they are equal to every requirement.

Fig. 2 shows a chuck with a square tapered hole for holding the old fashioned bits, and, although it lengthens the brace a little, only adds two ounces to the weight. This chuck is furnished with each brace. The company also furnish bits to fit these braces. Fully illustrated catalogues will be forwarded to any address on application.

STEEL CEILINGS.

Some very elegant examples of this new form of ceiling covering have recently been put in position by the manufacturer, Mr. H. S. Northrop, 30 Rose Street, New York. In our cut we represent the ceiling of the first National Bank, of Paterson, N. J., made in Empire style. The panels are 2 x 2 ft. and 2 x 4 ft., with centrepiece panels 4 feet square, a 2-foot border, and a 16-inch cove, with mouldings surrounding it. This is only an example of what can be done with this material, as the manufacturer has numerous patterns ready for immediate use, and will be pleased to send his illustrated catalogue to those interested.

A Large Day's Sawing.

At the sawmill of M. T. Jones & Co., of Lake Charles, La., recently, 191,323 feet of lumber were cut in eleven hours. This is said to be the largest amount of lumber ever turned out of a single circular sawmill in that number of hours. The saw was driven by a Corliss engine, having a cylinder 22 inches in diameter by a 40-inch stroke, the drive wheel being 20 feet in diameter, with a 30-inch face, the engine making 65 revolutions per minute, with an average steam pressure of 100 pounds. The mill was provided with a steam log turner and a twin feed engine, 13 x 24, and steam log trippers. The saw mandrel was 4 inches in diameter, with water-cooled journal boxes. The saw was 54 inches in diameter, No. 6 gauge, with 80 teeth. The steam was generated by sawdust taken direct from the saw. The credit of this feat is largely due to Mr. W. N. Elliott, saw filer, and Mr. Ed. Bullock, sawyer.

We are indebted for these facts to Mr. W. S. Whitman, chief engineer of the mill.

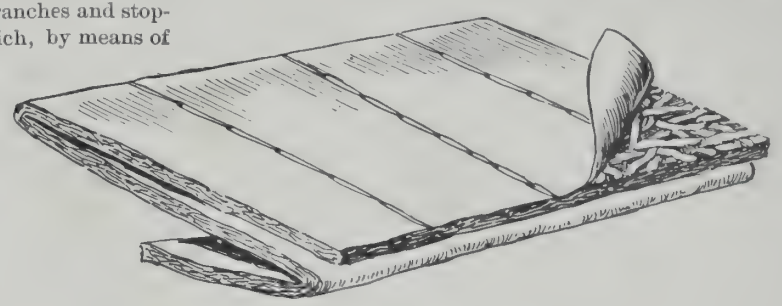
The New Mode of Constructing Foundations.

The method of converting a bed of sand into firm materials adapted for foundations, which Mr. Neukirch described before the American Congress of Engineers, is ingenious; but whether it is generally applicable, which the *Real Estate Record and Guide*, of this city, queries, remains to be seen. He converts the sand into a sort of concrete by forcing into it cement in powder through a pipe, by means of air pressure. The pipe has an internal diameter of about 1½ inches, and is drawn to a point at the lower end, in which there are three or more holes, of about three-eighths inch diameter. The upper end is connected by a bend and rubber tubing with the air pressure supply pipe in such a manner that the pipe can be raised, lowered, and moved while the air pressure is acting through it. In the air pressure supply pipe provision is made, by means of suitable branches and stop-cocks, for connecting an apparatus which, by means of an injector device, enables any desired quantity of cement powder to be fed into the air current. The air pressure, together with the cement powder, issues through the small openings at the lower end of the lance pipe, and is driven with considerable pressure into the sand foundation. This is very mobile where it is entirely under water, and consequently the blowing in of the cement produces a motion in the foundation pit similar to that in a vessel of boiling water, steam bubbles instead of air bubbles being formed.

The cement carried by the air is retained by the wet sand and forms sand concrete. By the boiling motion an intimate mixture of the wet sand with the cement is effected. After the injection of air has ceased, the grains of sand, in subsiding, adhere very firmly together, and experiments have shown that a natural bed of sand, after having one-fifth of its volume of cement injected into it, will, after the operation, occupy a smaller space than before. This was shown by the fact that the surface of the sand concrete lay deeper than that of the surrounding natural sand bed. The introduction of the lance tube into the sand bed is effected by first blowing air through it, so that the air issuing from the lower end forces back the sand, and in setting it in motion renders the sinking of the tube to considerable depths, such as 16 to 19 feet, readily possible in a comparatively short space of time; this operation is rather more difficult when the bed is not purely sand, but contains large stones, wood, etc. In this case it may be necessary to raise the tube again and to insert it at a different place, so as to avoid the obstructions. In order to insure a uniform mixture, the foundation pit is divided into small fields of from 8 to 12 inches square, and into each of these the required quantity of cement, which is ascertained by dividing the cubic contents of the field by the required proportion of the admixture, is blown. The lance tube is first sunk in each field down to the solid substratum by means of air pressure alone. When it has attained this depth, cement is supplied to the air current, and during the continued introduction of the cement powder the tube is slowly drawn upward until the required quantity of cement has been introduced.

SHEATHING QUILT.

"Sheathing Quilt," a newly patented material offered as a successor to back plastering, supplying both a non-conducting material as well as a deafener for buildings, is illustrated in our cut. It is composed of decay-proof and vermin-repelling grass, which is held in place as shown in the cut, by two layers of tough manila paper by quilting. Its ease of application and efficiency, it is claimed, give it a great advantage over back plastering, while its price makes it a cheaper finish. It can be used not only in dwellings, but in cold storage warehouses, ice chests, and similar structures. As a deafener for floors its light weight especially commends it. Samples will be furnished to architects and others interested upon application to the sole manufacturer, Mr. Samuel Cabot, 70 Kilby Street, Boston, Mass.



CABOT'S SHEATHING QUILT.

THE CANTON STEEL ROOFING CO., of Canton, Ohio, in their last annual catalogue and reference book, present an interesting list of their manufactures for the consideration of architects and builders. The company manufactures the H. W. Smith patent folded lock seam steel roofing, and all styles of sheet metal roofing, siding, ceiling, sheathing papers, anti-rust paints, the Wock patent slip joint eaves trough, etc. They also make all styles of conductor pipe, hangers, cut-offs, strainers, crestings, finials, etc. The factory of the company was destroyed by fire in December, 1892, but has since been rebuilt and equipped on a larger and more complete scale.



CEILING IN "EMPIRE STYLE."—"EMPIRE" BORDER AND COVE.—CENTREPIECE PANELS

RUSSELL WHEELER & SON, of Utica, N. Y., manufacturers of the Palace King Hot Water Boiler, have issued an eloquent little testimonial pamphlet, covering the experience of people using this boiler last winter. The boilers are thus shown to carry, in the most satisfactory manner, more radiating surface than they are rated by the makers to carry.

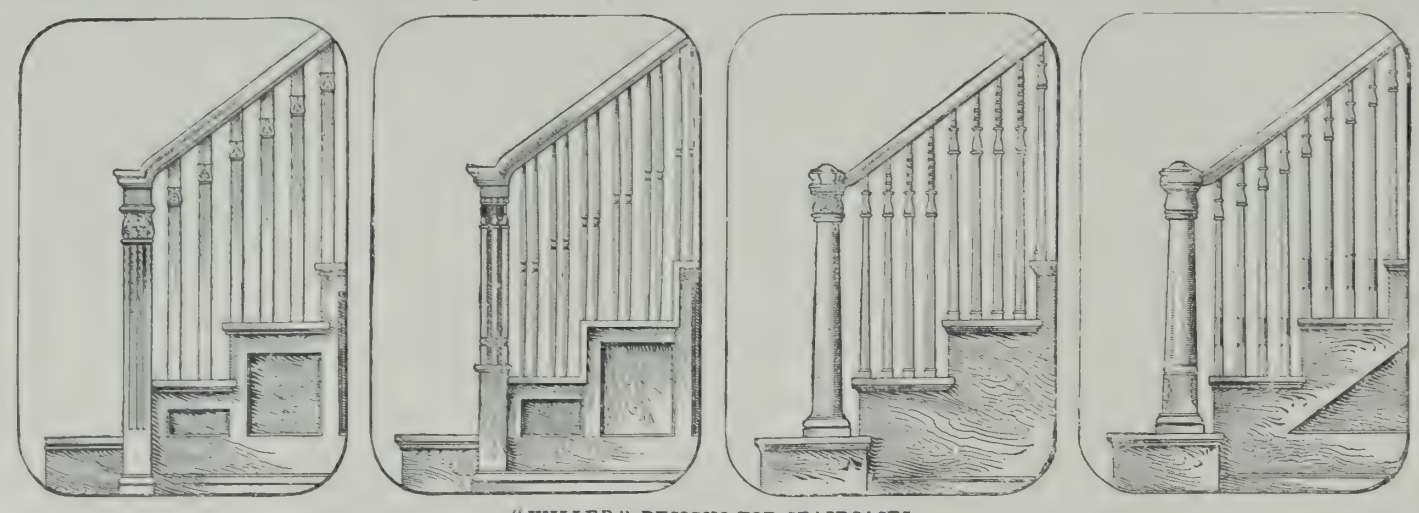
A Cap for the Obelisk.

Cleopatra's Needle, or the Central Park obelisk, has now a zinc, gold-plated cap, 4 feet 7½ inches high and 3 feet square at its base. Its weight holds it in place without rivets or cement. It has been found that obelisks were originally provided with a top covering. The obelisk has been partially treated again with hot paraffine, so that it will stand the rigor of our climate, and is now in first class condition.

A WATERPROOF preparation for coating walls, paper, and other fabrics, and water supply pipes, may be manufactured by dissolving shellac or resin in methylated spirit with application of heat. To the partially cooled solution lead carbonate and carbolic acid are added.

INTERIOR WOODWORK FOR BUILDINGS.

The Willer Manufacturing Co., of Milwaukee, Wis., make a specialty of fine interior hardwood woodwork for first-class buildings, especially the furnishing of fine staircases and stairwork. The illustrations represent a few



"WILLER" DESIGNS FOR STAIRCASES.

of the many original designs in this class of work to be found in their handsome illustrated catalogue. The goods they manufacture are not excelled in quality and workmanship, and their designs have long met with the hearty appreciation of architects, builders, and others looking for neat, ornamental, and artistic stairwork.

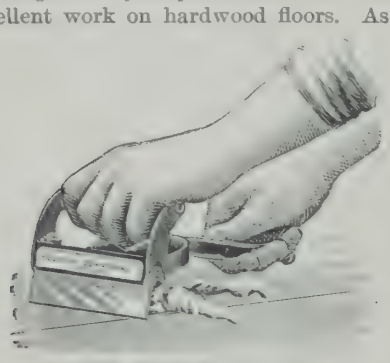
Electrical Injuries to Gas and Water Pipes.

The destructive action of electric currents extends to water and gas pipes, and to almost all other buried metals. The Bell Telephone Company, of Boston, has recently made a report on this subject, which embodies a large amount of useful information. The overhead single trolley system of electric railways seems to be the cause of most of the corrosion. The heavy currents appear to follow the cable sheaths of telephone cables as conductors. The lead of the cable sheaths is corroded wherever the current leaves the cable and passes into moist earth or the moist air of the ducts or manholes. The destruction has occurred in some places where the potential was less than half a volt. As long as the single trolley system is in use, similar results to those obtained in Boston may be expected. The injury to water and gas pipes is as serious as that done to telephone cables, as may be seen by the photographs which accompany the report.

A VERY elegant catalogue on ornamental marquetry, floors, walls, and borders has just been issued by The Interior Hardwood Co., of Indianapolis, Ind., giving the newest designs of the different cloths furnished by them, both as regards borders and fields. In addition to this we find especially catalogued wainscotings and wood carpet, the latter made in strips so as to be laid by anybody. The main advantage of these floors is that they are dust and insect proof, which renders them perfectly sanitary. The book is sent upon request to any one interested in hardwood floors.

AN IMPROVED SCRAPER.

This tool, which has recently been placed on the market, is well thought of by carpenters and woodworkers, and does excellent work on hardwood floors. As shown in



THE ECLIPSE SCRAPER.

the cut, it is well made, and can be used in any place where such a tool is desired. An illustrated circular will be forwarded by Chandler & Farquhar, 179 Washington Street, Boston, Mass.

Linseed Oil for Paint and Polish.

Linseed oil when it is poor, thin and weak in quality is but one-half its former self, and bad; but when it is adulterated with fish oil, cotton seed oil or petroleum (known in the trade as neutral oil), it is a pickpocket that will rob both you and your customer. I attribute the greater part of the trouble with bad paint to bad, adulterated linseed oil and turpentine. I have heard of a jobber who placed an order for two hundred barrels of turpentine, each barrel to be adulterated with twenty per cent. of kerosene oil.

In the suburbs of our large cities, where frame buildings are the custom, the practical man can immediately detect, after a few months have elapsed, the ready-mixed fraud, the linseed oil substitute fraud, and the silicate fraud. Each one has its peculiar look, and our enterprising manufacturers have their contracting master painters liberally distributed in all parts of the country. Their knowledge extends only to the brushing on of these compounds. From the practical point of the house painter I consider that linseed oil is the life of the paint; without it the substance could not be called paint. There is no other medium within the knowledge of the trade of equal value. It has all the requisite properties to hold the pigment, to spread evenly and wear a reasonable length of time. Good oil gives general satisfaction.

Linseed oil is from the seed of the flax plant from which linen is made. It grows in all parts of Europe, in the Western States of America, India and New Zealand.

LINSEED OIL POLISH.—It is well known that linseed oil is the base of almost all varnishes, and is used with shellac and alcohol to make the famous French polish. It may not be generally known that linseed oil in itself will make the most lasting polish that can be made. It was quite a common polish in the olden time, and was used especially for polishing the tops of dining room tables, because of the brilliancy of the polish and its ability to resist a great heat. The hottest dish could be placed on it without marring it in the least. The mode of producing this polish will show the nature of linseed oil in itself. The first coat is laid on with a brush and well rubbed into the wood; rubbed until the wood is almost dry. The second and all succeeding coats are rubbed on with a pad, and not only rubbed on with a pad, but rubbed dry with a pad. About one week is allowed between each rubbing. As the polish makes its appearance the surface is sponged with cold water and rubbed dry before each oil rubbing. This is continued for six months or a year, until the job is complete. The main features of this polish are the oil and the rubbing or polishing. I question if the modern science of varnish making has produced a varnish that will stand the test of the linseed oil polish. In this polishing operation there is something to be observed that will apply to our everyday work. It shows that thin coats well brushed out, with plenty of time to dry and harden between coats, make the most permanent job.

We are told that in drying, linseed oil gives off some elements and takes on others; notably, it gives off water and takes on oxygen; this is what produces the leather-like substance when it is dry. The pad passing to and fro over the surface of the table produces heat, which dispels the water and leaves a fresh surface of oil to absorb oxygen. This is the drying, or, I should say, the transforming of linseed oil from a fluid to a semi-solid state. After the first gloss is produced by rubbing, the oil does not readily take to the surface. Water acts readily on linseed oil; it opens up its surfaces, as it were, and fits it to amalgamate with the next coat of oil and rubbing.

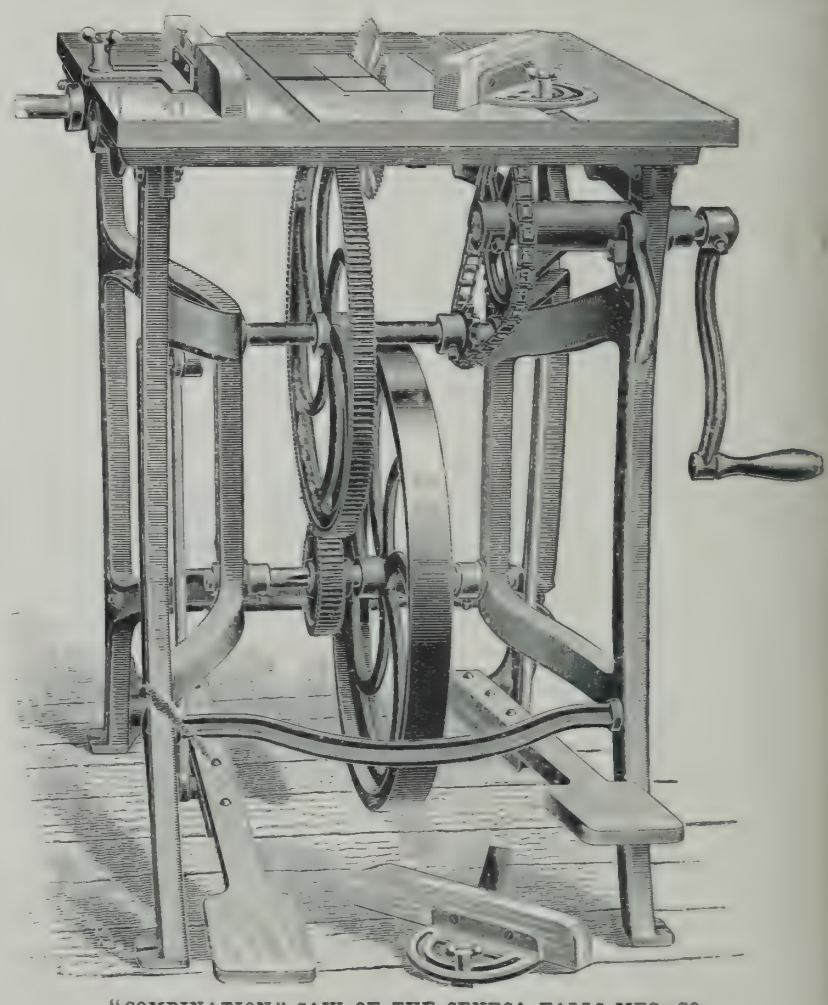
LINSEED OIL IN PAINT AND VARNISH.—On this subject an interminable discussion may be indulged in, as every painter and paint and varnish maker has a theory of his own; therefore, all I can offer is my own theory, from a practical standpoint, not a chemical one, as I lay no claim to chemical knowledge. We find the varnish maker uses the same principle in preparing oil for varnish as is used in the oil polish—heat, to dispel the water in the oil, and oxygen in the form of manganese, litharge, etc., to harden his oil. The gum stands for the body or number of coats. According to the quality of the gum and quantity of oil will be the quality of the varnish produced. The oil, as Mr. Hopner truly says, is nine-tenths of the virtue of the varnish, for, when sun and storm eat out the oil, the gum stands for nothing.

Linseed oil in paints, its use and abuse, is the most essential knowledge a painter should possess, and can only be acquired by careful study and close observation. Any theory advanced on the subject will be disputed by interested parties.

In paints for inside work, or to be protected by varnish, the minimum quantity of oil is used. In paints for outside work the oil is the standing quality or virtue of the paint; and, as in varnish, the quantity of oil and the quality of the pigment determine the life of the paint, to which must be added knowledge of the surface to be painted and the proper proportion of oil and pigment suitable to the surface. This knowledge all practical painters should possess.—*James Marks, in Painting and Decorating.*

IMPROVED CIRCULAR SAWING MACHINE.

This is a new combination circular sawing machine, a marvel of ingenuity, convenience, and practicability, which was recently patented. It is designed for carpenters, cabinet, pattern, picture frame, box, and beehive makers, and woodworkers generally. It is a very strong, substantial, and thoroughly well-built machine, suitable for various kinds of work, in light ripping, cutting-off, mitring, rabbeting, grooving, gaining, dadoing, edging-up, jointing stuff, boring, etc. It is made entirely of iron and steel, excepting the hardwood strips in the centre of table, on face of gauges and top of treadles. The power is transmitted entirely by gears and a chain belt, doing away with any slipping or lost motion. All gears are cut by automatic machinery and run smoothly. The foot power has a walking motion, by which much



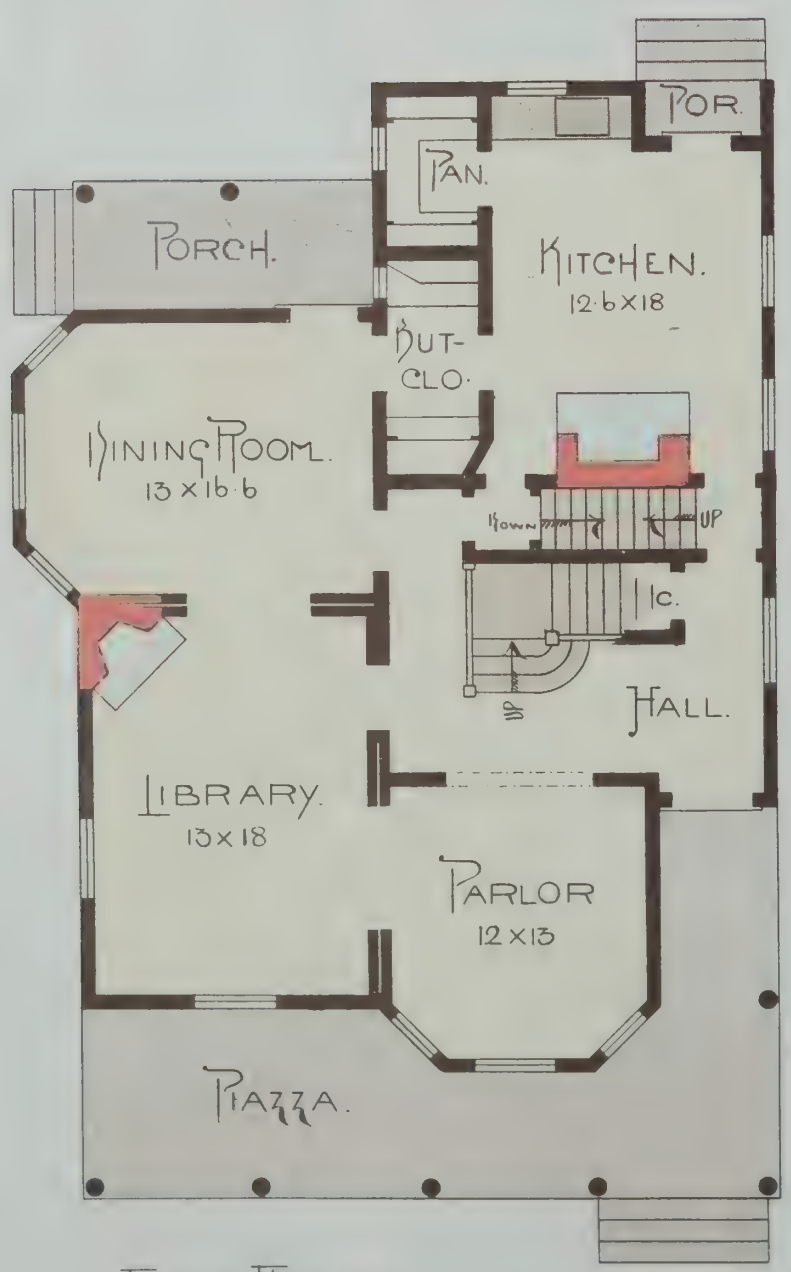
"COMBINATION" SAW OF THE SENECA FALLS MFG. CO.

greater power can be obtained with less fatigue than with any other kind in use, and it enables the operator to run the machine with both feet sitting, or one foot standing, as desired. The iron table is planed perfectly true, and in the centre of same is fitted two adjustable hardwood strips (one each side of the saw;) they are easily adjusted, and are very convenient in changing saws, cutter head, etc. The table is also provided with two adjustable sliding, cutting-off, or mitre gauges, and one ripping gauge, having steel slides which properly fit the grooves in table, thereby securing accuracy in their adjustments. The table is hinged at the back, and can be adjusted up or down by the handscrew in front for grooving, rabbeting, etc.

With this machine one man can easily do the work of four men with the common handsaw. It works accurately, saves time, lumber and labor, and will pay for itself in a short time. Weight of machine, 305 pounds. Boxed for shipment, 410 pounds. Manufactured by The Seneca Falls Manufacturing Company, 276 Water Street, Seneca Falls, N. Y., who also make a full line of foot and hand power machinery for wood and metal workers.



A COTTAGE AT BRIDGEPORT, CONN.



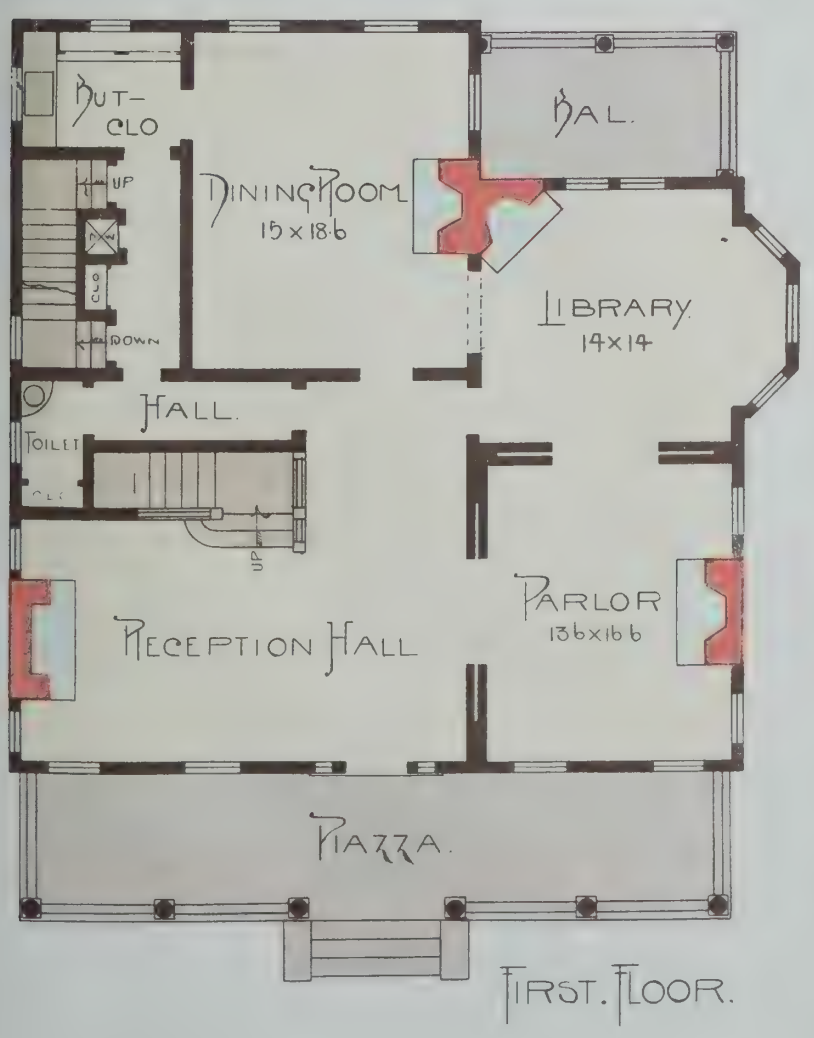
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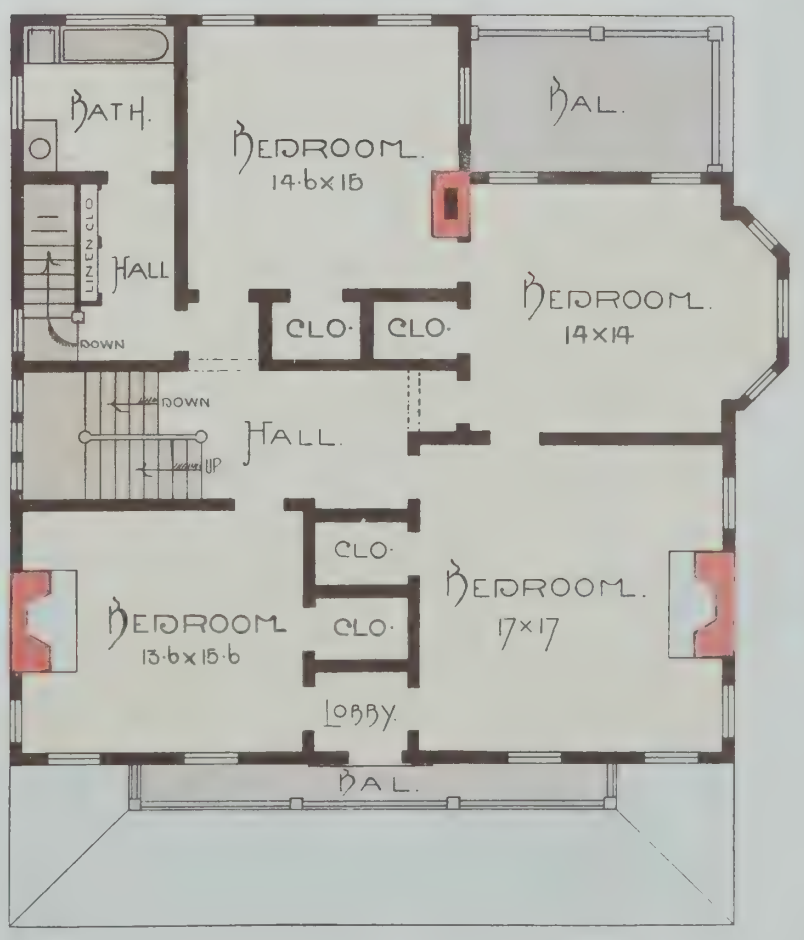
SECOND FLOOR.

A COLONIAL RESIDENCE AT STAMFORD, CONN.





FIRST. FLOOR.



SECOND. FLOOR.

SCHUMACHER & ETTLINGER, NEW YORK

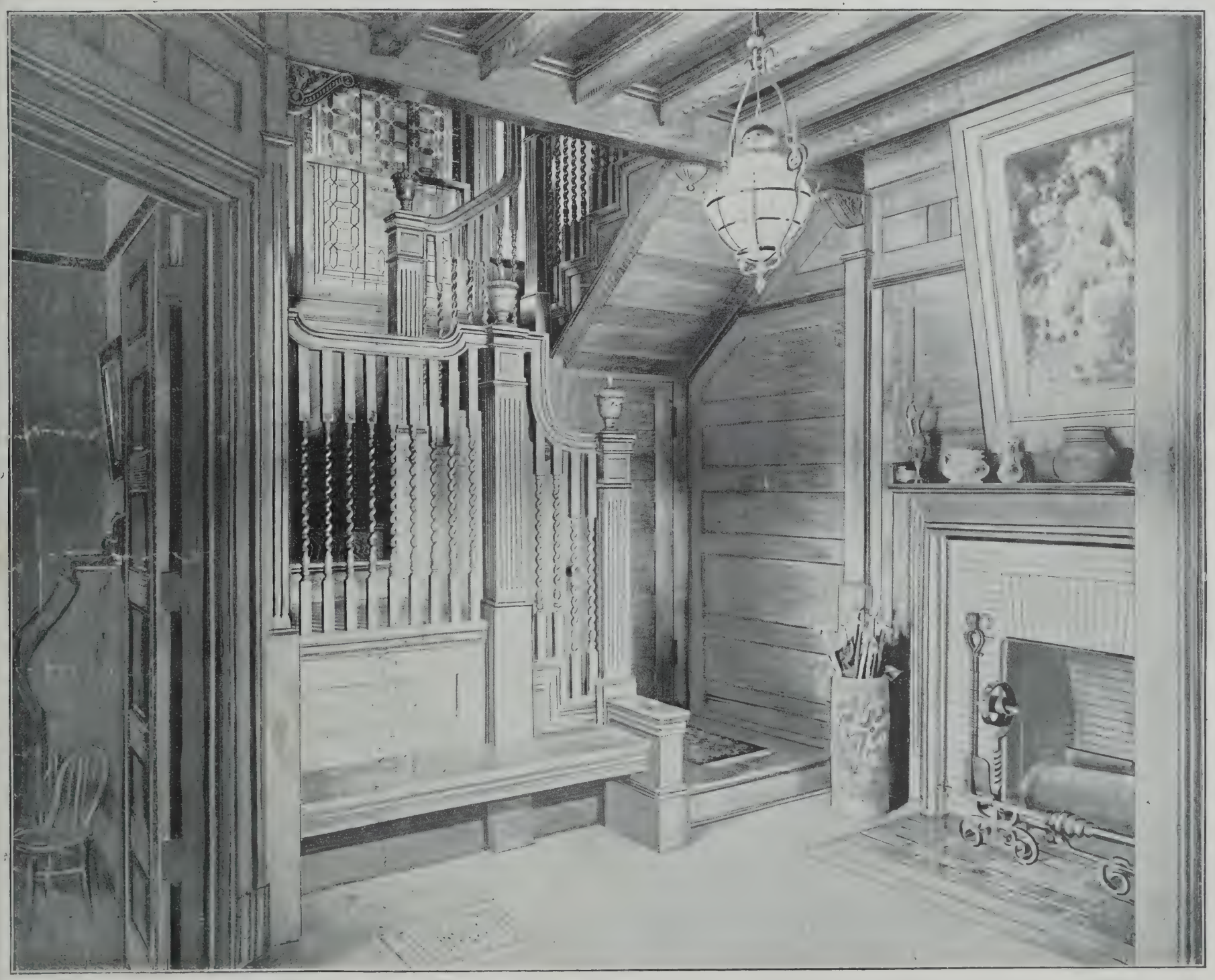
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A DWELLING AT CHESTER HILL, MT. VERNON, N. Y.—See page 79.

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THE

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A COLONIAL RESIDENCE AT STAMFORD, CONN.

The subject of one of our plates in colors in this issue is a residence recently completed for C. Cooper Clark, Esq., at Richmond Hill, Stamford, Conn. An additional view is given on page 85. The design is an exquisite example of Colonial architecture throughout, and the interior is treated in the same manner. The spacious piazza at front, the covered balcony at rear, the bay, dormer, and beaded windows, and the bits of carving shown in the design are all attractive features. The underpinning is built of local rock-faced bluestone, and the exterior framework is sheathed, papered, and then clapboarded, and painted Colonial yellow, with ivory white trimmings. Roof shingled and finished natural. Dimensions: Front, 40 ft.; side, 40 ft. 8 in. Height of ceilings: Cellar, 8 ft. 6 in.; first story, 10 ft.; second, 9 ft; third, 8 ft. 6 in. Hall, spacious, is trimmed with quartered oak. It has a paneled wainscoting and divan, and a staircase elegantly carved in Colonial style. The newel posts with carved capitals extend to ceiling, the space between being provided with carved brackets forming circular arches. The fireplace is built of pressed brick and terra cotta. The upper half of opening in fireplace is filled in with a wrought-iron frame, the squares being provided with mica, with excellent effect. The floors are of hardwood. Parlor is treated in ivory white and gold, and it has an open fireplace, furnished with tile trimmings and a Colonial mantel, made from a special design. Library is trimmed with cherry. It contains bookcases built in, and an open fireplace with a carved mantel Dining-room is trimmed with oak, and it has a paneled wainscoting, ribbed ceiling, and a hardwood floor. Butler's pantry is provided with dressers, inclosed with glass doors; butler's bowl and closet fitted up complete. The rear hall contains dumbwaiter and stairs to cellar and second floor. There are four large bedrooms, closet, and bathroom on second floor. These apartments are treated with colors in a delicate manner. Bathroom is wainscoted and furnished replete. Three bedrooms and trunk room on third floor. Kitchen, laundry, and its apartments are situated in the basement, and they are furnished with the usual fixtures replete. Cost $9,500 complete. Mr. Augustus Howe, architect, New York.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A COTTAGE AT BRIDGEPORT, CONN.

We publish as the subject of one of our plates in colors this month a residence recently erected for Thomas Cook Wordin, Esq., at Bridgeport, Conn. An additional view is given on page 85. The design is a most excellent one, Queen Anne in treatment, and it combines both attractive elevations and a well-arranged plan, showing many large rooms, which are finished in a very handsome manner. The underpinning is built of local bluestone, and the exterior framework above is shingled and stained a terra-cotta color, with light brown trimmings. Blinds painted bottle green. Roof shingled and painted red. Dimensions: Front. 35 ft. 4 in.; side, 46 ft. 6 in., not including front piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. The interior throughout is trimmed with whitewood. The doors and windows have heavy moulded casings. Hall, parlor and library are finished in mahogany, and dining-room in antique oak. These apartments have floors laid in parquetry. Hall contains an ornamental staircase, with a massive carved newel, balusters and rail. This staircase and hall are lighted by delicate stained glass windows, with exquisite effect. Fireplace in library is furnished with tile trimmings, and a hardwood mantel of mahogany, with beveled plate mirrors. Kitchen and pantries are trimmed and wainscoted with North Carolina pine, finished natural. It is provided with fireplace for range, pantry, butler's closet and sink complete. There are four bedrooms, large closets and bathroom on second floor, and two bedrooms and trunk room on third floor. Bathroom is wainscoted and provided with the usual fixtures. Cemented cellar contains furnace, laundry and other necessary apartments. Cost $5,000 complete. Mr. Henry A. Lambert, architect, Bridgeport, Conn.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT NEW HAVEN, CONN.

The engravings which are presented on page 80 show a perspective, and on page 79 an interior view of a residence recently erected for Edward W. Alling, Esq., at New Haven, Conn. The design shows a good style of architecture, excellent construction, and a convenient interior arrangement, finished in the best possible manner. The underpinning is built of local brick, and the first and second stories above are clapboarded and painted olive gray, with darker trimmings. Roof shingled and finished natural. Dimensions: Front, 31 ft. 10 in.; side, 37 ft., not including front and rear porches. Height of ceilings: Cellar, 7 ft. 6in.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. Lobby is trimmed with ash and it has a tiled floor. Hall, spacious, is trimmed with ash. It is a unique apartment, containing an ornamental staircase, paneled divan, and an open fireplace with tiled trimmings, and a hardwood mantel with columns and mirror. Parlor and dining-room are trimmed with similar wood, and these apartments are separated by double sliding doors. Butler's pantry is furnished with the usual fixtures complete. Kitchen and pantry are trimmed and wainscoted with North Carolina pine, finished natural, and they are provided with hardwood floors. Second floor is trimmed with similar wood, and it contains four bedrooms, ample closets and bathroom, the latter wainscoted with ash and furnished replete. One bedroom and ample storage on third floor. Cemented cellar contains laundry, furnace and other apartments. Cost $4,500 complete. Messrs. Stilson & Brown, architects, New Haven, Conn.

Our engravings were made direct from photographs of the building taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT HARTFORD, CONN.

The engravings on page 88 present a very attractive residence recently erected for R. Burton, Esq., at Hartford, Conn. It is treated in the Colonial style, and it has a pleasant porch, balcony, and bay windows. The exterior is shingled throughout, and is stained and finished a silvery gray, shaded a moss green. The roof is shingled and stained a similar green. The underpinning is built of local sandstone of a reddish brown color, with faces left rough as they come from the quarry The "Dutch" chimney at side is built of North Haven brick, and they are laid up in red mortar. Dimensions: Front, 34 ft.; side, 45 ft., not including front porch. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. Hall is trimmed with antique oak. It has a beamed ceiling, forming deep panels, which are filled in with narrow beaded work, and a paneled divan. The staircase is of unusual beauty in its design. It has a carved newel post extending to ceiling, forming arches. provided with spindle transoms. This staircase is provided with a seat on first landing, and is lighted by a cluster of windows, glazed with muffled glass, giving an exquisite tone of coloring. Parlor is treated in ivory white and gold. The fireplace is trimmed with tiles, and is provided with a Colonial mantel with mirror and columns. The piano window in parlor and the buffet window in dining-room are glazed with stained glass. The other windows throughout are glazed with plate glass. The floors are of hardwood, laid in narrow widths. Dining-room is trimmed with oak, and is provided with a bay window, thrown out at one side, a pleasant nook, separated by an archway with a spindle transom, and fitted up with a window seat, and a fireplace built of red brick, extending to ceiling, with facings and a hearth of same, and furnished with a carved oak shelf. Butler's closet is provided with a countershelf with sliding shelves, under which are cupboards and drawers. Above the countershelf china closets with shelves are fitted up with glass doors. Kitchen is trimmed and wainscoted with white pine, finished natural. It contains a fireplace with a Boynton range, dresser, closet, sink, and large store pantry, broad enough to admit ice box and other stores. The second floor is trimmed with white pine, finished natural. It contains four bedrooms, closet, and bathroom. Bathroom is wainscoted with tiles, and is provided with the usual fixtures; exposed plumbing. Hall and staircase are open to third floor, which contains two bedrooms, servant's room, trunk and storage rooms. The middle chamber (14 ft. 6 in. x 16 ft.) has an open fireplace built of brick, with hearth of same, and provided with a mantel. It has also a paneled divan running past the windows, the entire length of the room. It is 3 feet wide. The front room has a similar divan. Cemented cellar contains furnace, laundry, and other necessary apartments. Cost $7,800 complete, including range, furnace, and everything ready for occupancy. Mr. Henry D. Hooker, architect, New York.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

PATENTS.

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A COTTAGE AT BOSTON, MASS.

We publish on page 82 a dwelling, showing a good design and plan, which has been recently erected for D. H. McKay, Esq., at Boston, Mass. Foundation, stone. Underpinning, local stone laid up at random. The exterior framework is sheathed, papered, and clapboarded on first story, and painted Colonial yellow, with white trimmings; second story is shingled and stained sienna. Roof shingled and finished natural. Dimensions: Front, 23 ft. 6 in.; side, 34 ft., not including front piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. Cemented cellar under whole of house, containing furnace and all necessary apartments. The interior throughout is trimmed with whitewood, finished natural, with the exception of parlor, which is treated with ivory white in a delicate manner. This apartment has a very pretty fireplace, furnished with tiled trimmings and a mantel with Colonial columns and mirror. Hall contains an ornamental staircase, with turned newels, balusters, and rail. This stairway is lighted by a stained glass window. Dining room and parlor are separated by double sliding doors. Kitchen is wainscoted with narrow beaded stuff, and it is provided with sink, washtubs, lobby large enough to admit ice box, and a large, well fitted up pantry. There are four bedrooms, closets, and bathroom on second floor, and ample storage on third floor. Cost $2,400 complete. Austin W. Pease, architect, Boston, Mass.

Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

A DWELLING AT CHESTER HILL, MT. VERNON, N. Y.

We publish on page 81 engravings and floor plans of a dwelling recently completed for P. H. Lucas, Esq., at Chester Hill, Mt. Vernon, N. Y. An interior view is also given on page 77. The main lines are straight, but they are well broken, giving a very pleasing exterior and a good interior arrangement. The building is built in the most substantial manner. The underpinning is built of brick, laid up in red mortar. The first story is clapboarded, and the second and third stories are shingled. It is painted Colonial yellow, with ivory-white trimmings. Roof slated. Dimensions: Front, 32 ft.; side, 39 ft. 6 in., not including piazza and porch. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The interior throughout is trimmed with antique oak. The floors are of oak, laid in narrow widths. Vestibule has a tiled floor, and a paneled wall and ceiling of oak. The hall is the most elegant apartment. The ceiling is heavily beamed, and the walls are paneled the full height to ceiling. The fireplace is built and faced with Tiffany brick, and is provided with a tiled hearth with wrought-iron trimmings, and an oak mantel. The staircase is of an excellent design, with newel posts, balusters and rail. It has a seat, and is lighted by a leaded window of stained glass, shedding a soft light over upper and lower halls. Library is provided with bookcases. Parlor is furnished with a fireplace with tiled hearth and facings, and a hardwood mantel with mirror, made from a special design. Dining-room, spacious and well lighted, is provided with a paneled divan. Kitchen and pantries are wainscoted, and are furnished in the most complete manner. There are four bedrooms, large closets and bathroom on second floor, and three bedrooms and trunk room on third floor. Bathroom is wainscoted with tiles, and it is fitted up complete; exposed plumbing. The stairway and hall are open to third floor. Cemented cellar contains furnace, laundry, and other necessary apartments. Cost $7,000 complete; including furnace and everything ready for occupancy. Louis Herbert Lucas, architect, Mt. Vernon, N. Y.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

A COTTAGE AT MYSTIC, CONN.

We give on page 86 an interior view, and on page 87 an elevation and floor plans, of this attractive little house. Dimensions: Front, 29 ft., not including veranda; side, 27 ft. Height of ceilings: Cellar, 7 ft.; first story, 8 ft.; second story, 8 ft.; third story, 10 ft. The underpinning is stone to ground line, capped with granite, and finished in brick. The cellar and chimneys are laid in Portland cement. The cellar is cemented, has outside entrance, contains furnace with flue to every room; also, stationary tubs, etc. The exterior framework is sheathed diagonally with 6 in. matched spruce, covered with heavy building paper, clapboarded and shingled, painted in two shades of warm gray. The roof is cedar shingled, and painted dark red; the blinds are also dark red, and are operated by the "Mallory shutter worker." The interior is plastered with adamant, gray finish, and trimmed throughout with North Carolina pine, natural wood, hard finish. The kitchen has range, boiler, etc., and is finished entire in North Carolina pine, as also are the passages, pantry, bathroom, and room in third story. The floors throughout cottage are double, with heavy deadening felt between, and have antique oak stain. The centre pane in upper sash of all windows is surrounded with squares of cathedral glass, amber tints. The dining-room has china closet, glass front, recess for sideboard. Stained glass in upper sash of bay. There is also stained glass in front door. The staircase does not show; it is of easy ascent, and well lighted by window at head. The arrangement does away with the necessity of a rear stairway. The architect contends that in a small cottage an ornamental staircase takes up a great deal of room, allows most of the heat to be lost in the second story, causing correspondingly cold draughts from above. Ventilating registers are placed in all bedrooms and bathroom. The conservatory, entered from dining-room, is cemented. The large windows can be removed in summer, making it a balcony, if desirable. The parlor has good sized tiled fireplace and hearth, carved mantel of North Carolina pine. Estimate complete, including plumbing and heating, $3,000. John S. Rathbone, architect, New London, Conn.

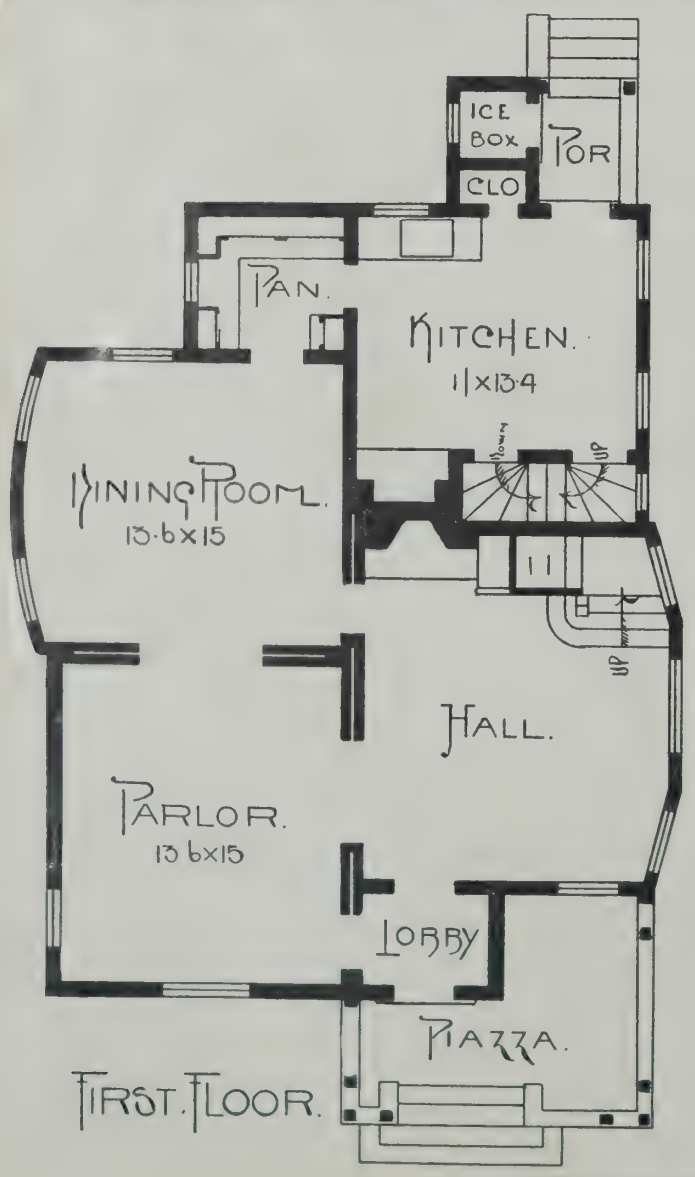


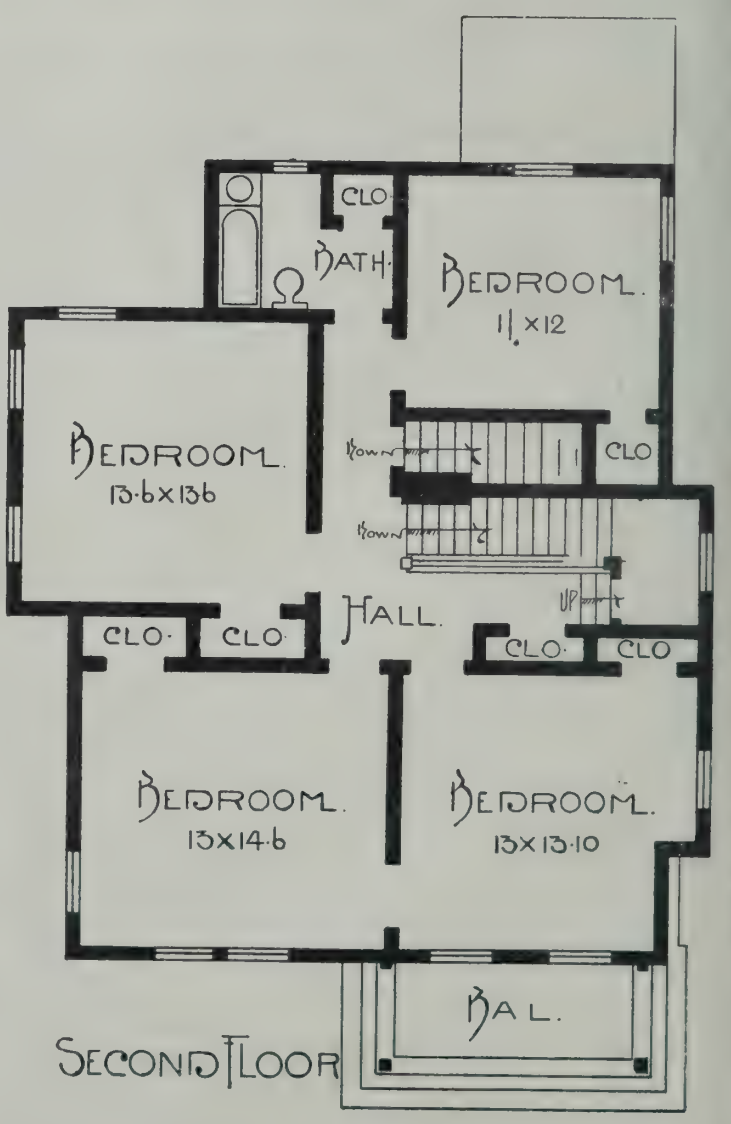
A RESIDENCE AT NEW HAVEN, CONN.—See page 78.

A DWELLING AT STAMFORD, CONN.

We illustrate on page 84 a dwelling recently completed for Charles H. Martin, Esq., at Stamford, Conn. The design is picturesque and the floor plans unique. presenting a very complete interior arrangement. It has a spacious piazza at front entrance, returning at side, and a pleasant porch at rear entrance. The underpinning is built of North Haven red brick, laid up in red mortar. The building above is covered with hemlock boards and then papered. The first story is clapboarded with beveled Michigan strips; second and third stories are covered with circular cut shingles. Roof shingled and painted red. Dimensions: Front, 27 ft. 8 in.; side, 35 ft. 8 in., not including front piazza and rear porch. Height of ceilings: Cellar, 7 ft.;





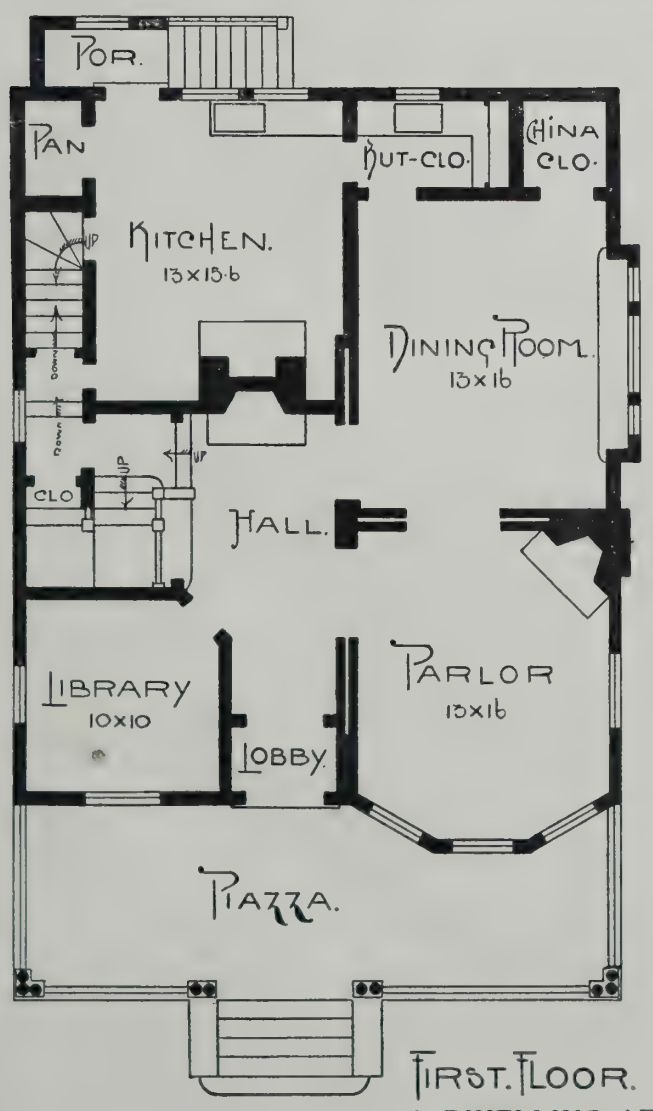


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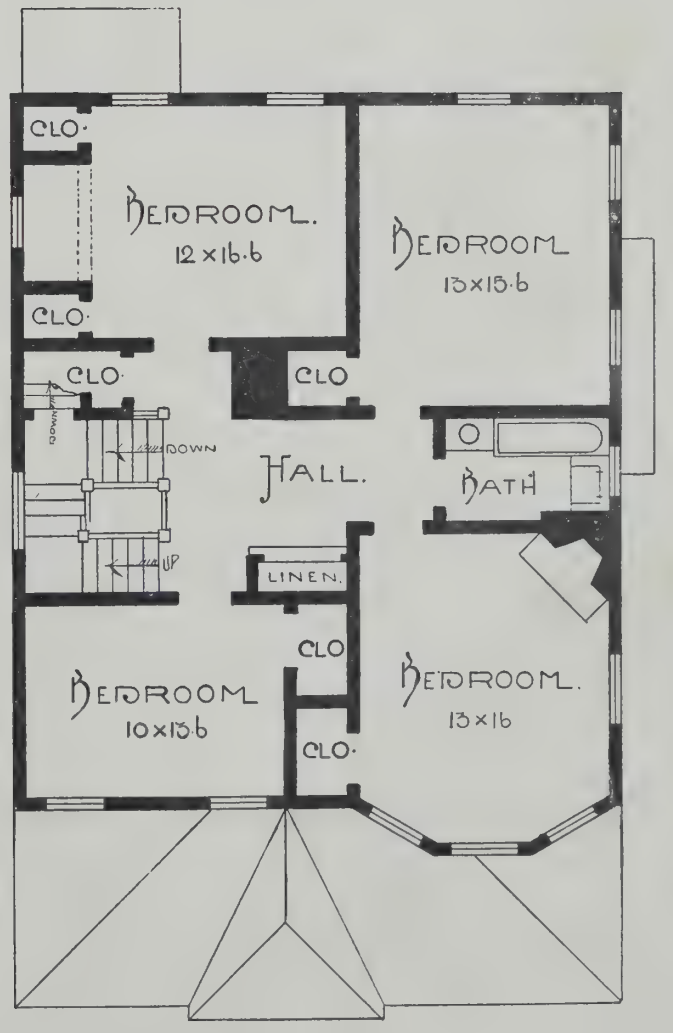
A RESIDENCE AT NEW HAVEN, CONN.—See page 78.







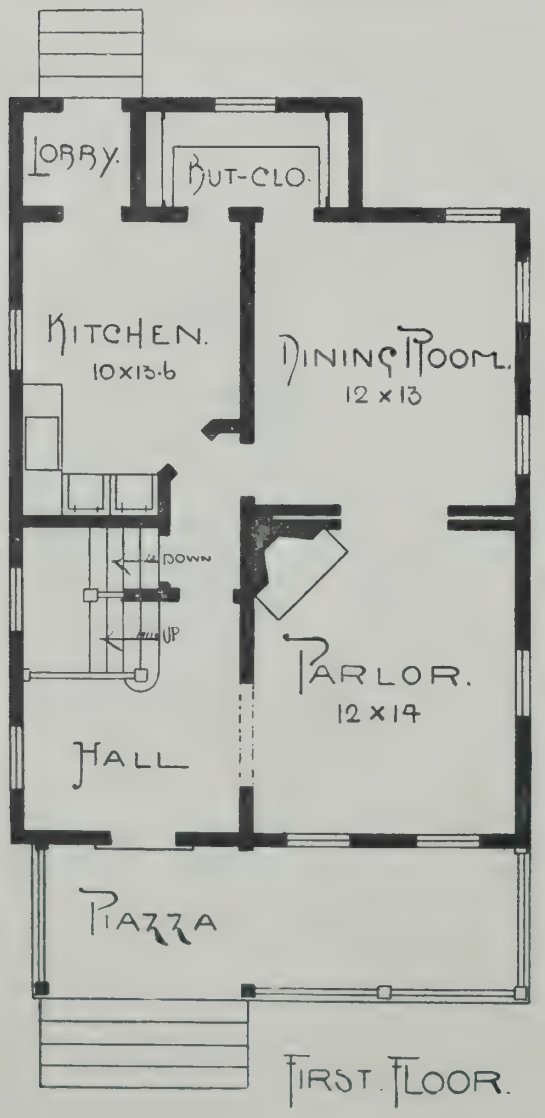
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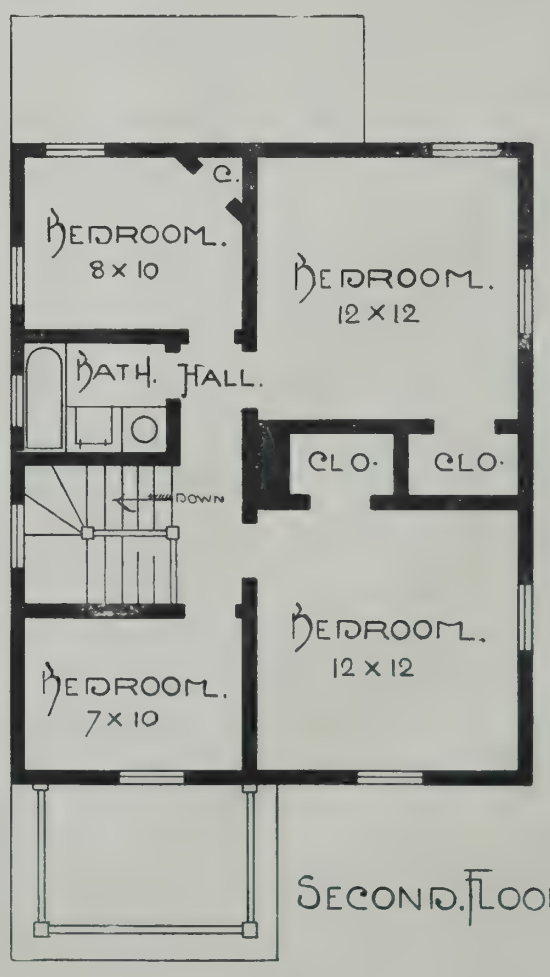


SECOND. FLOOR.

A DWELLING AT CHESTER HILL, MT. VERNON, N. Y.—See page 79.







BOSTON PUBLIC LIBRARY

A COTTAGE AT BOSTON, MASS.—See page 79.

first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. Hall and lobby are trimmed quartered oak. The floors are laid with oak in narrow widths and highly polished. The newels, balusters and rail at staircase are turned out of similar wood. Parlor and dining-room are trimmed with Western whitewood, finished natural. Both of these apartments are lighted by large plate glass windows, and are separated from hall by square archways provided with spindle transoms. Parlor is provided with a hardwood mantel, and dining-room has an open fireplace, furnished with tiled hearth and facings and a similar mantel. Kitchen and pantries are trimmed and wainscoted with Norway pine, and are furnished with the usual fixtures in the best possible manner. The second floor is trimmed with white pine, finished natural. It contains four bedrooms, closets and bathroom, the latter wainscoted and fitted up replete. Three bedrooms and ample storage on third floor. Cemented cellar contains furnace, laundry and other necessary apartments. Cost $3,500 complete. Messrs. Munn & Co., architects, New York City.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

The Education of Customers.

This country is well supplied with architectural papers, many of them ably conducted, of superior value as instructors of architects, exhibiting the theory, mathematics, principles, practice, rise and progress of architecture from the earliest ages. The aggregate circulation of these works is quite limited, being confined chiefly to purely professional architects, a comparatively small class, comprising throughout the entire country probably not over three thousand. The SCIENTIFIC AMERICAN occupies quite a different field. It aims principally to educate the customers of architects and builders. This it accomplishes by placing before them a constant succession of fresh and splendid illustrations of attractive buildings and plans. The beneficial influence of this method is very great, very practical, and is sensibly felt by architects and builders in all parts of the country. Their services are in greater demand, because their customers, no longer satisfied with cheap and ordinary buildings, now ask for the latest, the newest, and the best designs, such as the SCIENTIFIC AMERICAN brings to them.

Our paper goes to the masses of the people, who love to look at and study the representations of good buildings.

Where the SCIENTIFIC AMERICAN freely circulates, there architects and builders thrive, there property is intelligently improved; and everybody knows that property, if attractively improved, is increased in value.

The SCIENTIFIC AMERICAN has by far the largest circulation of any architectural paper in the world, because it not only goes to architects and builders, but also to *their customers*, who vastly exceed the former in number.

This, also, is the reason why the SCIENTIFIC AMERICAN has the largest advertising patronage of all the architectural papers. It is *these customers* who order and pay for the plans, and the buildings, and the plumbing, the painting, the hardware, the walling, the papering, the heating, the lighting, the decorating, the finishing, the furnishing, and every other blessed thing that is used or placed within or without the building. "We get good returns for money spent in the SCIENTIFIC AMERICAN," say advertisers, and that settles the question.

When our builders' edition first appeared, nearly all the architects were down upon it. They say we gave away their plans free to the public, and the effect would be to take bread from their mouths. But they now find, by actual experience, they were mistaken. The SCIENTIFIC AMERICAN promotes their business by educating their customers, and creating a demand for their higher and more profitable class of plans and designs.

How to Catch Contracts.

When a customer calls to talk house to an architect or builder, one of the readiest means to inform and interest him is to show the various numbers of the SCIENTIFIC AMERICAN. These are replete with photographic pictures of new and tasteful dwellings and plans. Our customer looks at this one and that, until he finds a plan that nearly suits his fancy, except that the kitchen is not just as he could wish, or the hallway, or that closet, or, "I should like it better if a dormer window were there," or some other minor change were made. To which the builder frankly replies that he understands his wishes to a dot, and will be glad to make up a plan for him; will have it ready to-morrow; and, moreover, "it sha'n't cost you a penny." This liberal and agreeable treatment is highly appreciated by the customer. After his departure, our architect or builder whips out his tracing paper, follows the plan selected, puts in the few changes suggested, perhaps adds a front elevation of the house, all involving but a short time. The customer, on calling, is delighted. The drawings look like new plans specially made for him; is satisfied this architect or builder is the man for him. His mind is at once made up, and the bargain soon settled and closed. Such, in brief, is the way it works, and we have not related any fairy story. It is the short narrative of hundreds of actual instances. We say to architects and builders everywhere, your interests are sure to be promoted if you keep on hand and make yourself familiar with the numbers of the SCIENTIFIC AMERICAN, so that you can readily display them to your customers, and point them to examples such as they require. There is no other work like it, none that has so wide a circulation among builders, none that does them so much practical and financial benefit. It assists to educate customers up to the point of having good houses, and it does this quickly, for it employs the most effective of all means for rapid education, namely, the *attractive and truthful picture.* Nearly all the illustrations given are photographic plates made from the buildings, showing all the minute details. These plates are specially prepared for the SCIENTIFIC AMERICAN. Every number presents a new and fresh supply. They are not fancy sketches, but genuine photo plates of the objects they purport to illustrate. You cannot do a better thing for yourself than to subscribe for this paper. You cannot do a better thing for your fellow architects and builders and for your neighbors than to urge them to subscribe.

The circulation of the SCIENTIFIC AMERICAN stimulates and promotes the building of new and improved houses. We know of towns where every builder is a subscriber, and all are full of business. People who see illustrations of handsome buildings are greatly influenced thereby. A notable improvement in architecture takes place in all towns and villages where the SCIENTIFIC AMERICAN freely circulates. Improved architecture increases the value of property. This is a self-evident proposition. Therefore, do all you can to boom this important and most useful periodical. This number closes the year. Next number begins a new year. Now is the time to renew your own subscription and to add another for your friend. Can you think of a better holiday present for him?

Hints to Readers.

The present number completes another year in the history of our publication and closes the volume. We are not in doubt as to the utility of our publication. The affirmative evidence is overwhelming. Go where you will throughout the length and breadth of this great country, and on every hand will be found new and tasteful buildings, the counterparts of which were given in the SCIENTIFIC AMERICAN, from which they were planned and erected.

No publication has ever been issued in the architectural line from which so many dwellings and homes have been chosen and built. The reason is simple. In every number we place before the reader a variety of new plans and designs of the most practical nature. Not fancy sketches, of which there can be doubt as to realizing the details when the work of building is begun; but actual plans and perspectives of the latest designs of houses already erected. In almost every instance the plans we publish are produced from the buildings themselves, the perspectives being from photographs specially taken by our own artists. Therefore, when a plan is chosen from the SCIENTIFIC AMERICAN, the builder knows that it is practical. The exact details, form, proportion, dimensions, arrangement of everything, stand before the eyes, ready for the closest measurement and the most careful study.

Every family having in contemplation the building of a home should, as a matter of economy, possess this most valuable work, for in its pages, at the low cost of $2.50 a year, they have before them the best perspective examples of existing dwelling houses and the most fresh and approved interior plans therefor. This will be a great aid in selecting and deciding upon the character of the intended home, besides saving them time and money.

As to the value of this periodical to builders and architects, it is needless to dwell. It speaks for itself. What signifies to them the trifling sum of $2.50 a year, for a helper in the plan and perspective line that is so sure to aid them in closing valuable contracts amounting to hundreds and thousands of dollars?

The special object of these remarks is to remind our present readers of what we are doing for them, and to ask them, now at the threshold of the time when new subscribers are to be gathered in, to speak good words for us among their friends, thereby encouraging us and promoting the extension of our work.

The Latest and Best Designs for Houses.

The present number of our journal completes the year, when an excellent opportunity will be afforded for the entry upon our books of new subscriptions.

One of the distinctive features of our publication is the presentation in every number, both in colors and in halftone prints, of new and fresh collections of photographic views showing recently built dwellings, and other structures, with the floor plans. In this way we place before the reader a great variety of the very latest and most approved forms of construction, not from one locality only, but selected from every part of this great country. Wherever good taste prevails in the display of architecture, especially in the branch pertaining to homes and dwelling houses, there the artists of the SCIENTIFIC AMERICAN, with their cameras, do sooner or later make their appearance.

The usefulness and influence of our periodical are now widely and permanently established. Many of those who contemplate the erection of buildings now consult its pages for good plans and elevations, which are here given in numerical profusion.

The practical builder finds the SCIENTIFIC AMERICAN to be almost a necessity for himself and for his customers. With the plans and photographic elevations which we give, the builder is enabled easily to modify or to duplicate any of the structures we illustrate.

The photographs show the exact form, position, and details of the principal parts, and the builder is never at a loss how to proceed. Of these facts we have the most abundant and convincing testimonies. Many thousands of new buildings have been and are constantly being erected in all sections of the country from the plans given in the SCIENTIFIC AMERICAN, and as a result there is to be seen on every hand a marked and growing improvement in architectural styles. Builders now aim to select, even for the cheapest houses, the most tasteful designs, and of these the SCIENTIFIC AMERICAN regularly furnishes to them an abundant and satisfactory supply.

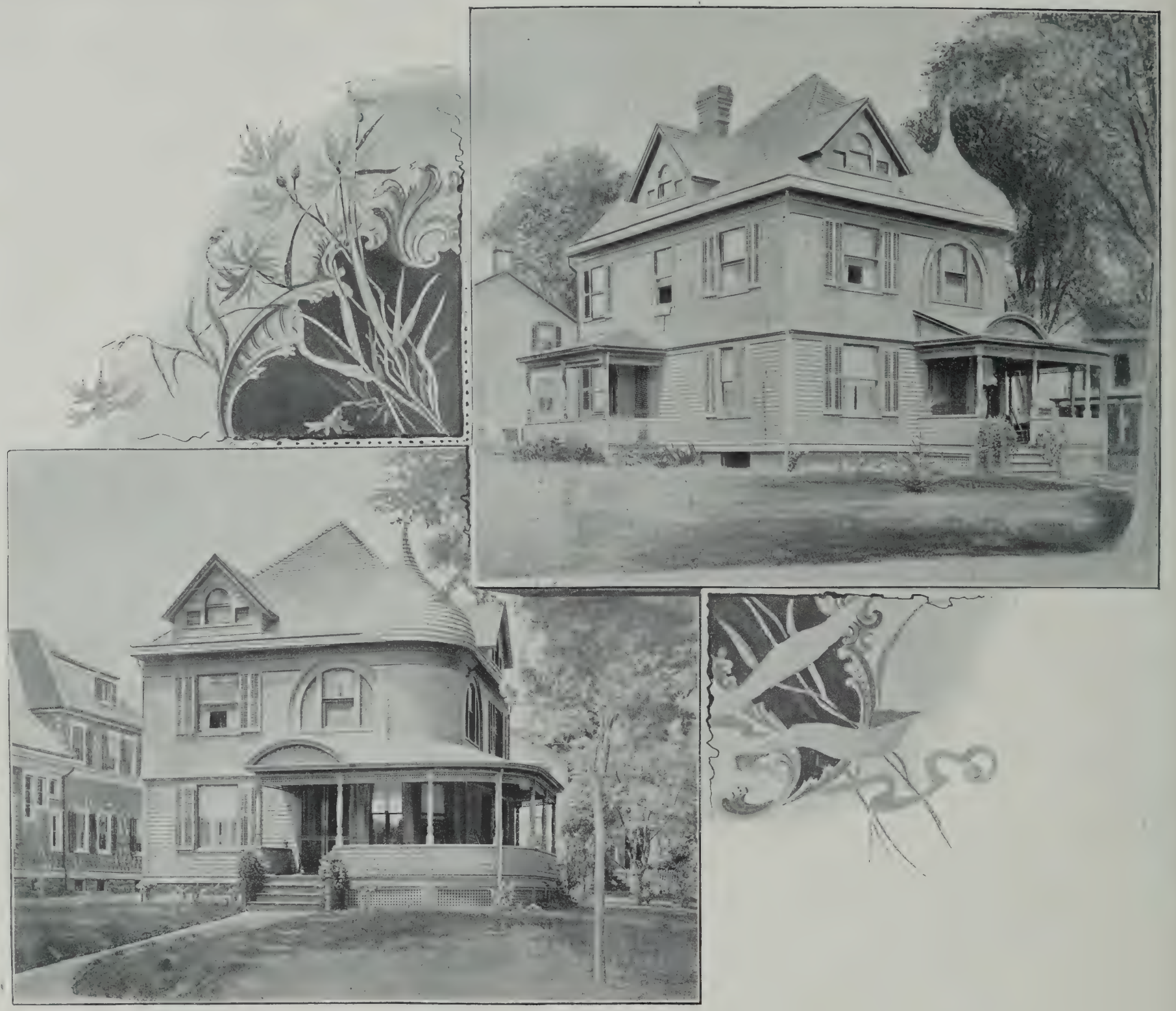
When the design of the building is selected and the work of construction begun, the next subject for consideration is the plumbing, the warming, the lighting, the hardwaring, the finishing, and finally the furnishing and household fittings of the building. In all of these matters the pages of the SCIENTIFIC AMERICAN teem with the most valuable information. Here may be found the illustrated announcements of the most reliable manufacturers of every class of materials, goods, and appliances required in buildings. In this department of the paper upward of two hundred engravings are given in every number. The value as a convenience to the reader in having constantly at hand an illustrated, comprehensive directory of the latest productions cannot be overestimated.

Labor Day.

We must confess that we never hear "Labor Day" or "Labor's Holiday" mentioned without a feeling of contempt and disgust for the impudent demagogism on one side, and cowardly servility on the other, which have brought the descendants of those who prepared and defended the Declaration of Independence down to the embodiment in legislation of the idea that, instead of all men being born free and equal, there are two sorts of men in this republic, one consisting of the members of certain organizations, and the other including the miscellaneous persons who do not belong to these organizations, and that those who do belong to them are entitled to favor and recognition from the government, which is not accorded to other people. In a community whose whole public system is founded upon the idea that there should be no class legislation, it is certainly curious to find, of late years, statute after statute enacted at the demand of the crafty and ambitious foreigners who control the forces of "organized labor." For several years "organized labor" has, or would have had, but for internal squabbles, things pretty much its own way in the legislatures, but just now circumstances which neither legislatures nor walking delegates can control have given a very large number of citizens more leisure than usual for thinking, and there are indications that a good many of them are reflecting whether, after all, they might not be as well off in the simple capacity of "free and equal" citizens of the republic as they are now in that of abject slaves of a foreign tyranny which dictates to them when, how, with whom, and at what price they shall work, which prevents them from teaching their own business to their own children, and which forces them to sit idle and see their families suffer, when work is plenty, for the sake of "sympathizing" with some other people, of whom they never heard, and whose relations to them consist solely in a concerted scheme of their respective leaders for their private advantage.—*Amer. Architect.*

Tests of Paving Materials.

An apparatus is in use at the government testing station at Charlottenburg, Berlin, employed to determine the wear on paving and flooring materials, which, as described in the *Zeitschrift für Transportwesen und Strassenbau*, consists in substance of a horizontal cast-iron disk of about 31 inches diameter, which is driven by a bevel gear making 22 revolutions per minute. The revolutions are registered by an apparatus in connection with it, which strikes a gong at the completion of each twenty-second revolution. Then ¾ ounce of powdered Naxos, powdered pumice, is spread on the disk immediately in front of the testing-piece in such a way that the whole amount of powder must pass the sample. This is pressed against the disk by a one-armed lever weighted with 66 pounds, so that a smooth surface of nearly eight square inches is exposed to the grinding process. After 110 revolutions are completed motion is suspended, and the previously weighed testing-piece, after being carefully dusted with a brush, is weighed over again. Then the sum of the different losses by wear, divided by the specific weight of the respective material, will give the amount of wear in cubic centimeters.







A DWELLING AT STAMFORD, CONN.—See page 79.

A COLONIAL RESIDENCE AT STAMFORD CONN. See Page 78



A COTTAGE AT BRIDGEPORT CONN SEE PAGE 78



THE WORLD'S COLUMBIAN EXHIBITION: A GENERAL VIEW.*

(Continued from the November Number.)

The Horticultural building, by Messrs. Jenney & Mundie, of Chicago, consists of a central dome, constructed with lattice ribs of light steel springing from the ground, the dome itself being 180 feet in diameter and 115 in height, and is placed in the centre of a square pavilion. At the extreme ends of the façade on either side are two-storied pavilions, 118 feet on face and 250 feet deep. These are connected with the central structure by two low one-storied galleries, 90 feet apart, thus forming an open court of this width between them for the display of flower gardening, etc. As to the general scheme of the exterior, it seems to be founded, in its main essentials, more or less on the Library of St. Mark, at Venice.

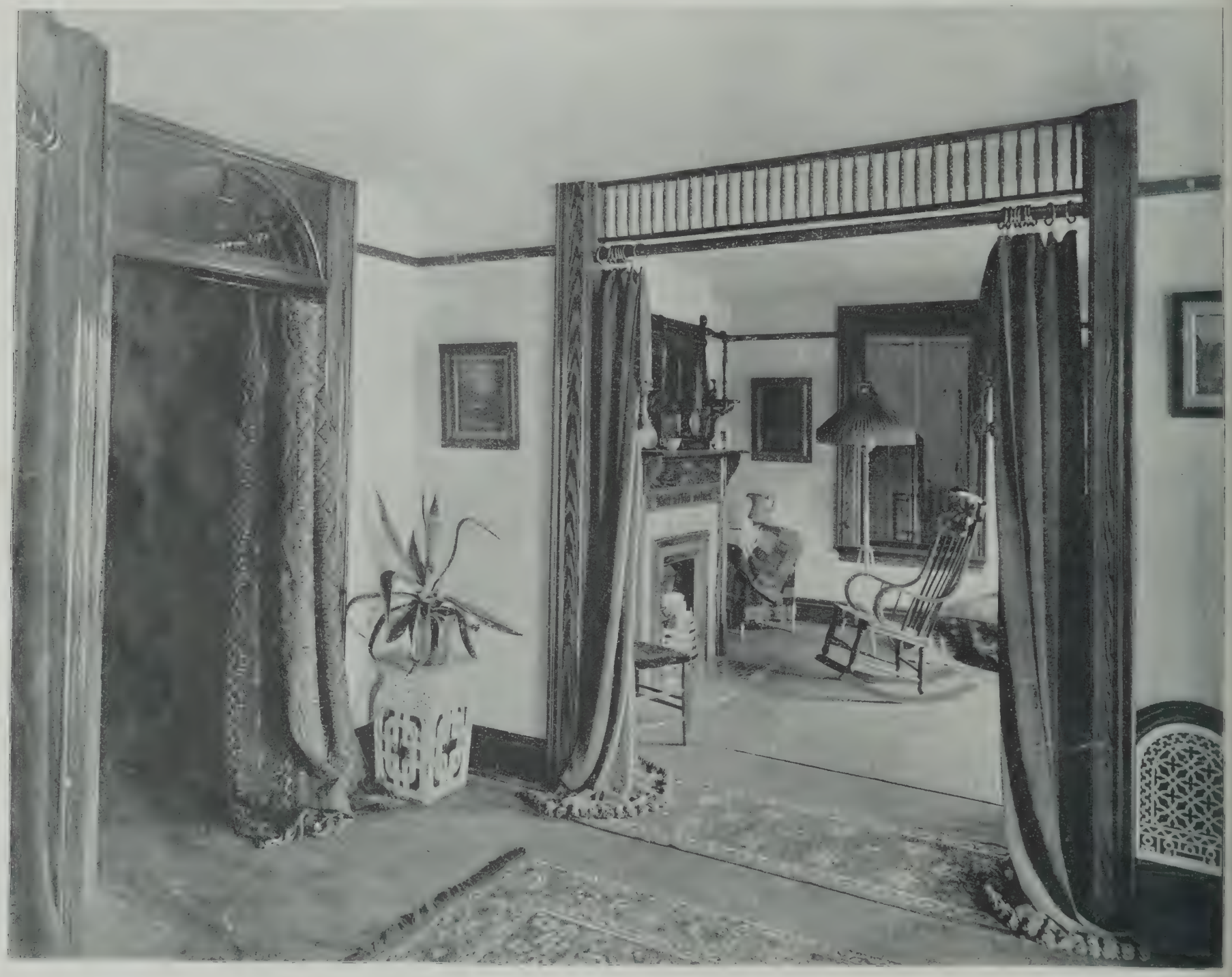
The United States Government building is rectangular in plan, and measures 350 ft. by 420 ft. In the centre is placed a dome, 120 ft. in diameter and 150 ft. in height, constructed of steel and supported on sixteen columns. The space below the dome gives access to all the principal galleries, whose main axes run north and south.

The Fisheries building is by Mr. Henry Ives Cobb, of Chicago, and consists of a large central structure, with two smaller polygonal buildings covered with pyramidal roofs, and connected with it on either side by arcades. The extreme length is 1,100 ft. by 200 ft.

The Art Building is a very chaste piece of modern French work of the most refined and scholarly type. It is by Mr. C. B. Atwood, of Chicago, the designer in chief to the Exhibition. In plan it consists of a central building, 500 ft. by 300 ft., with a central gallery, 70 ft. wide on the centre of each axis and in one height. At the point of intersection of these galleries rises a flat dome, 60 ft. in diameter, springing from a low pediment on each face above the roof. At the end of each of the naves, where they abut on the façades, are grand entrance porticoes of Ionic column. On either side of the main building are one-story annexes, 200 ft. by 120 ft., which are connected with the main building by colonnaded galleries, and which project toward the north, thus forming a three-sided court toward the main front; these are treated somewhat similarly to the main building, with colonnaded entrances on two of the faces, and low central stepped dome. The upper parts of the walls behind the smaller colonnades to the wings have reproductions of the Parthenon frieze, harmonizing well with the general Greek feeling pervading the design and with the purpose of the building. Mr. Philip Martiny has executed the other sculpture work on the building, and his figures representing Architecture, Painting, and Sculpture on the main frieze are very finely conceived. The building is fireproof throughout, necessitated, of course, by the costly contents. The *tout ensemble*, as seen across the lake in front, is one of the most satisfactory of modern "classic" designs that we know of.

The Woman's building, erected from the designs of a lady architect, Miss Sophia Hayden, of Boston, and a graduate of the Massachusetts Institute of Technology at that place, is Renaissance in design. In plan, the main feature is the great hall, 250 ft. long and 67 ft. wide, in one height, with elliptical roof and lantern light. This central hall is surrounded by a two-story structure, consisting of committee rooms, lecture rooms, etc. Staircases are placed at each angle of the building. On the inner part of the flat roof is placed the restaurant, while the outer portion is used as a roof garden. The elevation consists of a ground story of Ionic pilasters formed into columns, where the colonnade occurs, and an upper story of Corinthian pilasters and entablature, above which is a screen of small columns, standing above the parapet, and with caryatids interspersed, thus forming a screen for the training of creepers, as in some of the Genoese palaces.

*Abstract from the *Builder*, London.



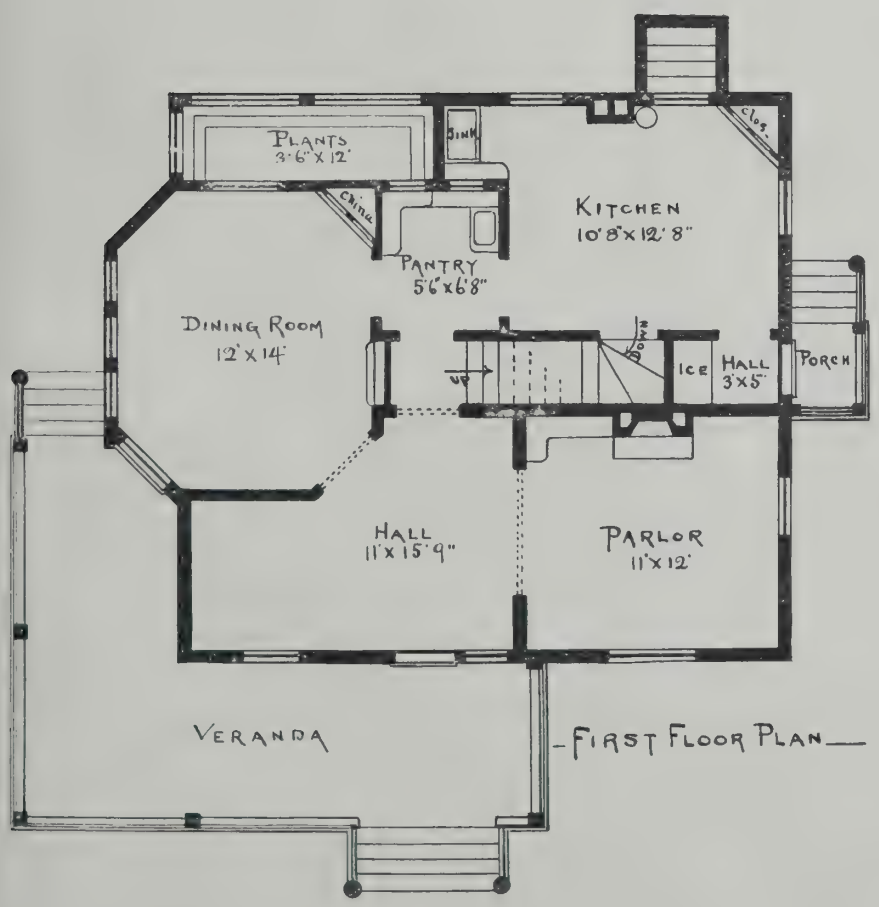
A COTTAGE AT MYSTIC, CONN.—See page 79.

The Builder's Friend.

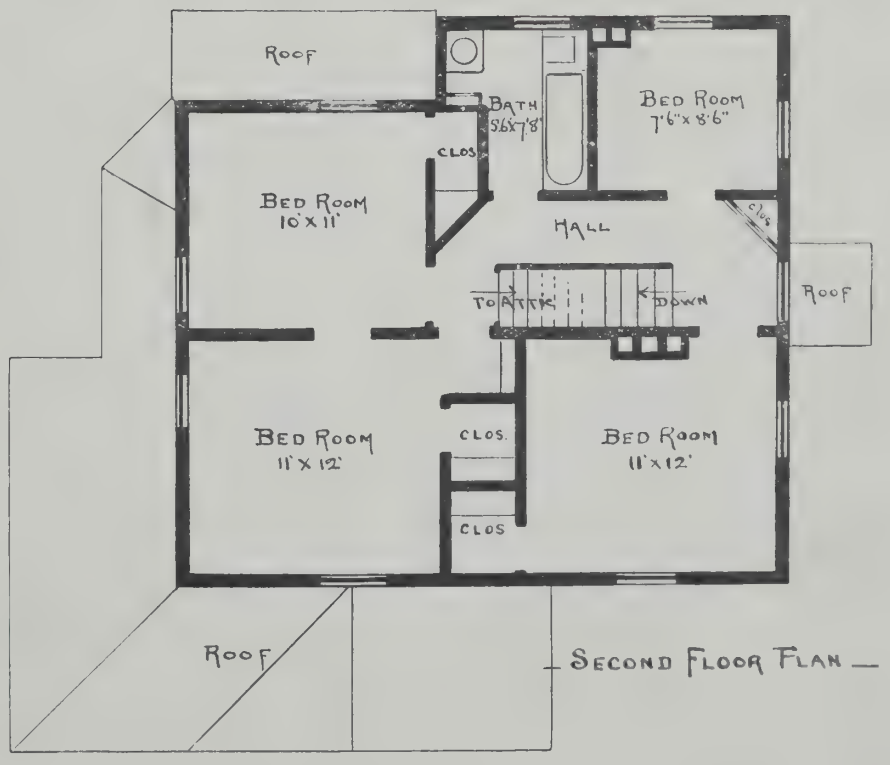
When any one begins to think about building a home, he is apt to say to himself, "I will have the house built just as cheaply as I can, at the same time make it as attractive in exterior and as comfortable within as possible." The next step is to search for plans, and perhaps some friend directs him to the Scientific American. Here, to his surprise, he finds spread before him a wonderful variety of photographs of neatly constructed dwellings, with the plans. First he runs over the most economical houses, those for six hundred, twelve hundred or two thousand dollars. He studies the plans carefully, makes himself familiar with the details, the forms and the appearances, which the photographic plates readily enable him to do. The goodwife, the daughters and the sons, all do the same, and in the course of their searchings and studies they find their attention almost insensibly directed toward the better class of houses, of which plans and photographs are also given. And on studying these better houses, they are found to be so much more comfortable, roomy, and in every way superior that the notion of a "cheap as possible house" has vanished, and the more sensible conclusion is decided upon that "We will have the very best house our means will permit." Hundreds of architects and builders in all parts of the country can testify to this educative influence of our paper upon their customers. Many builders know by experience that by this means jobs which at first promised only fifteen hundred dollars have been raised to four or five thousand dollars.

It makes a heap of difference to an architect or a builder whether he is employed on a wretched little cheap house or on a good, substantial one. Manifestly, then, it is to their interest, as well as that of their customers, to have the Scientific American widely circulated, and its photographic pictures and plans brought everywhere to public notice. Every architect and every builder can do something to aid this good work. Talk about it to friends and customers. Get them to subscribe. It costs only $2.50 a year. It is the cheapest, finest, and most useful architectural work ever produced. Every number is intrinsically worth more than the price of the year's subscription. Where can a builder find in one number a dozen plans of attractive new houses, with splendid plates in colors, for $2.50? They are not to be had except in the Scientific American, and for the money stated instead of one number, we give a year's subscription. We say specially to architects and builders, you were never before supplied with a paper that did you so much good, that tended so much to help you to business and to profitable contracts, as the Scientific American. We therefore ask you to do all you can for us. Remember, the more subscribers we have, the more we can beautify and improve our publication, and thereby increase your advantages.





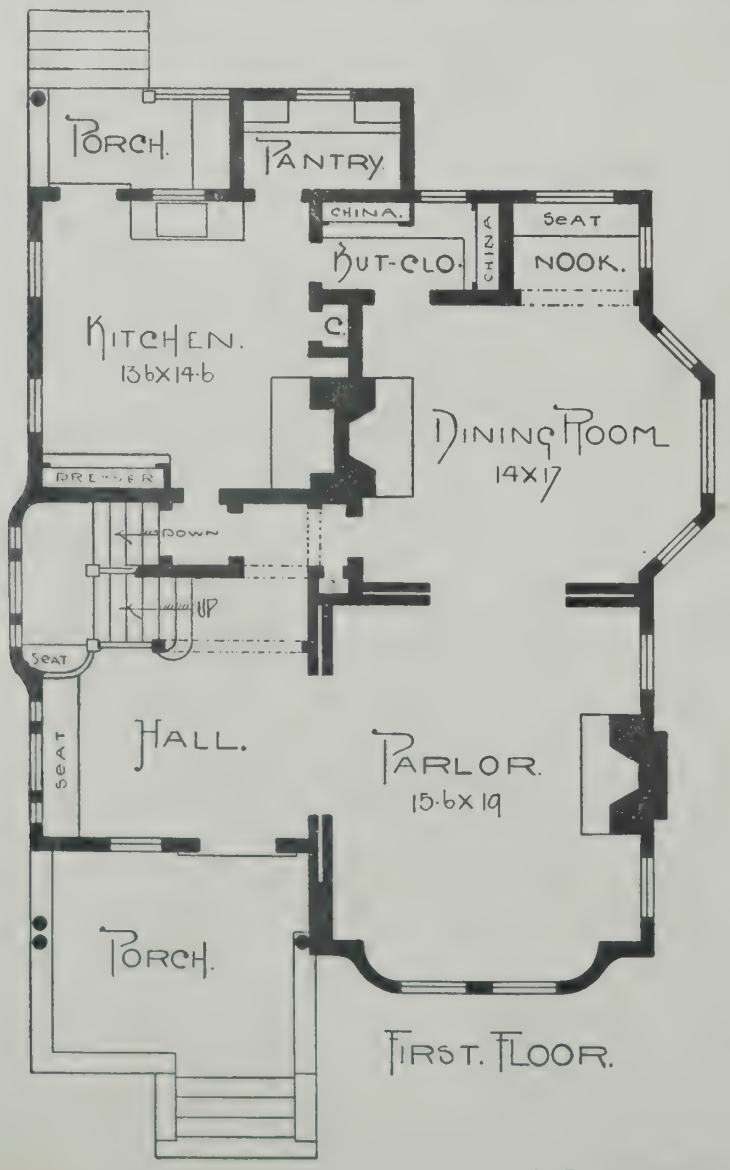
FIRST FLOOR PLAN



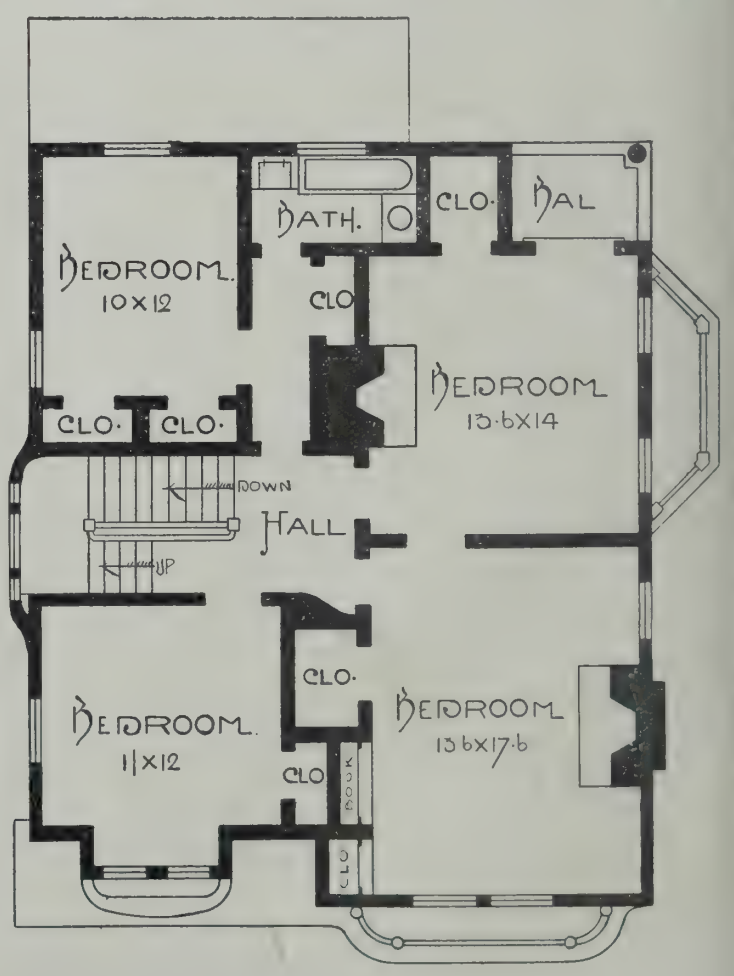
SECOND FLOOR PLAN

A COTTAGE AT MYSTIC, CONN.—See page 79.





FIRST. FLOOR.

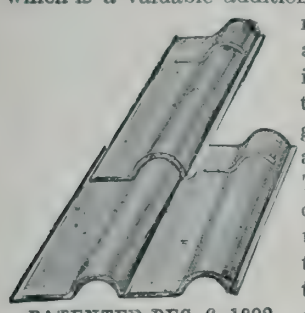


SECOND. FLOOR.

A RESIDENCE AT HARTFORD, CONN.—See page 78.

A DURABLE AND ORNAMENTAL ROOF.

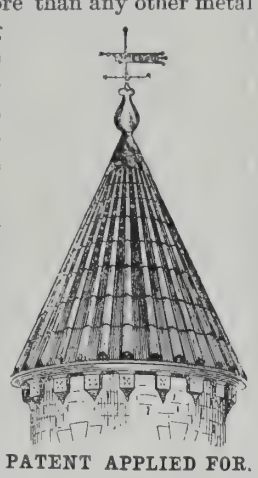
Messrs. Merchant & Co., of Philadelphia, Pa., tin plate manufacturers and importers, have recently put upon the market a graduated tile, shown in the illustration, which is a valuable addition to their regular "Spanish" metal tile, and which is adapted for covering all conical towers, circular roofs, turrets, domes, etc., being so graduated in size and form as to fit almost any radius. This tile is manufactured in copper, steel, or tin, the latter being painted in imitation of the red clay tile. As tower roofs are always the most difficult portions of a building to get at to repair or repaint, they should be covered with that which will never require either. Copper, therefore, is the only material that will meet these conditions, being indestructible, and becomes richer in appearance with age.



PATENTED DEC. 6, 1892.

An important feature in connection with this tile, both in the regular "Spanish" pattern and the graduated, is the lock, which is so constructed that the water cannot enter it, but is carried from the lock instead of to it. In this feature these tiles are superior to others, and, being of the "Spanish" pattern, they present much the richest appearance, and have been the most desired form through past ages, and are most sought after to-day by those who admire the "artistic."

The prime object of the manufacturer of these tiles, aside from the ornamental feature, is to encourage the use of a more substantial material for roofing, viz., copper, which, while costing more than any other metal adapted for roofing, has lasting qualities so far superior that the property owner will have the assurance in using same that a second roof will never be required, the first cost being the only one.



PATENT APPLIED FOR.

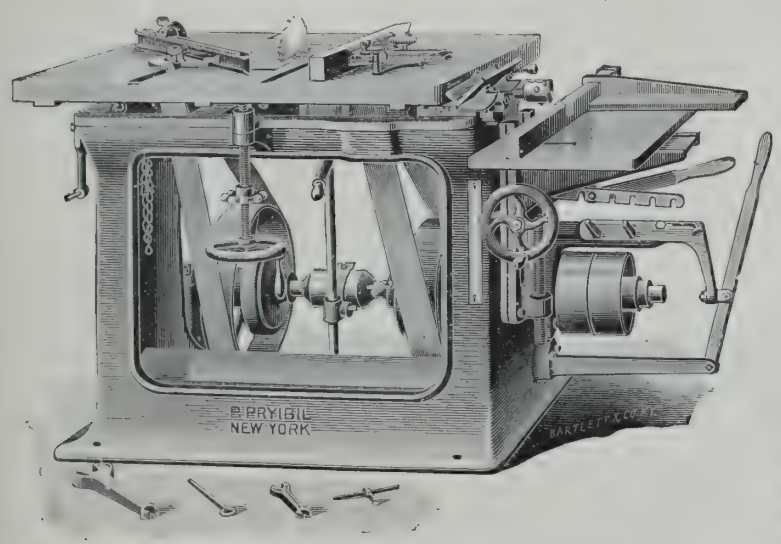
The Merchant & Co.'s metal "Spanish" tiles were used on numerous buildings at the World's Fair, prominent among which were the Colorado, Minnesota and Missouri State buildings. The tile is also in use on the new City Hall, Tacoma, Wash., and the Chamber of Commerce Building, Portland, Oregon; also the new Princeton (N. J.) Inn, a beautiful building, the roof of which is almost entirely covered with copper tile, and presents a very rich appearance.

The graduated metal tile, being made to conform to any radius and easily applied, effects a saving of material and labor, avoiding the usual waste experienced in laying straight tiles designed for ordinary work. In other words, with this graduated tile the manufacturing will be done at the factory, and not by the roofer on the building.

AN IMPROVED WOOD-WORKING MACHINE.

This machine has been designed especially for wagon makers. It is small and compact, and carries a 12-inch circular saw, having loose and tight pulleys for starting or stopping the entire machine, and friction clutches for running the saw or the chamfering cutter independently.

The saw, the chamfering cutter, and the boring bit are all carried on separate arbors, running at proper speeds, and not interfering with each other. None of them need to be removed to make room for the others; but when it is desired to cut grooves, the circular saw can be replaced by a dado head. The table is hinged at the back and arranged to swing up and down by means of a screw, to give the saw or the dado head any desired depth of cut. The boring table is adjustable vertically by means of a screw, and it slides to and from the bit by the operation of a hand lever. It is provided with an adjustable stop to limit the depth of hole bored, and with an adjustable fence and gauge to determine the position of the hole.



PRYIBIL'S COMBINED SAWING, BORING, AND CHAMFERING MACHINE.

The chamfering is done by an independent cutter, which can be set to cut any width up to one inch. The machine is self-contained on a box-shaped body, made in one piece, and not liable to twist out of shape when placed on a weak or uneven floor.

Weight about 700 lbs.

Floor space required, 5 ft. by 3 ft. 2 in.

The tight and loose pulleys are 8 in. in diameter for a 3-inch belt, and should make about 765 turns per minute.

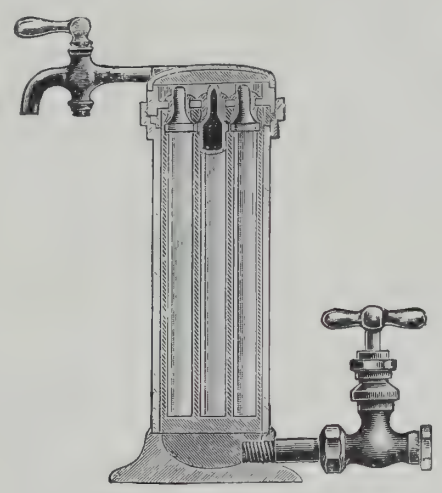
For further particulars, address the manufacturer, P. Pryibil, No. 507–519 West 41st Street, New York City.

THE PASTEUR FILTER.

To be threatened in our health and life, it is sufficient that one dangerous microbe should find its way to the water we drink, having been introduced there by washing some sick person's clothes with it, or by the direct contamination of some patient's excreta, or by some other accident of the same nature. This water could be perfectly clear and brilliant in appearance, and would, therefore, seem quite wholesome; but, nevertheless, any one using this apparently pure water may be contaminated.

Whatever may be the contagious disease, the prophylaxy of which is to be determined, water intended for drinking purposes should be free of any pollution.

River and spring water, and also well and cistern water, contain a certain number of microbes. Consequently, when drinking such water, two cases are likely to present themselves: Either these microbes will not meet such conditions as would be necessary for them to thrive, and then they will rapidly die; or they will meet with favorable elements, when they will multiply in our system.



THE PASTEUR FILTER.

In the first case, they will have no action; in the second, they will bring illness and death as its consequence.

What, then, shall be done to avoid the conditions which science has thus set before us in connection with the daily use of water?

The constant use of boiled water is bound in time to be dangerous. Boiled water is not chemically composed like ordinary water. Some of its component parts, such as carbonate of lime, are precipitated, and some of its gases are set free. Some salts of which it is deprived would be missed by our system, which draws many of its constituent elements from drinkable water.

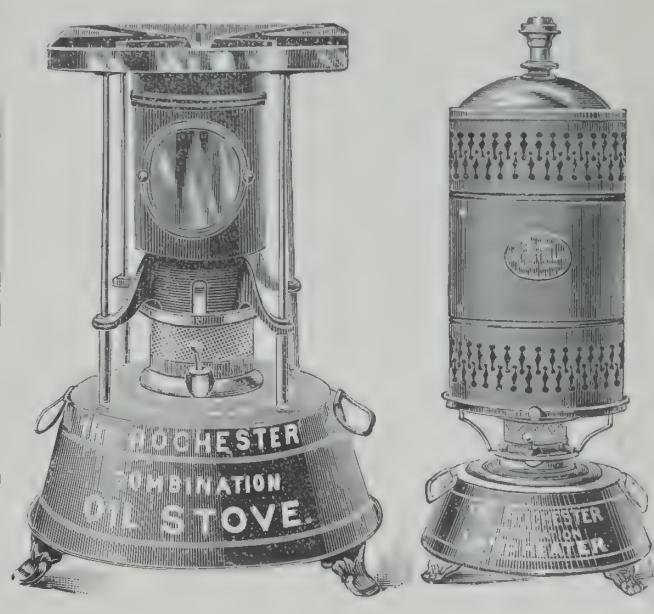
To protect ourselves against all the dangers brought by drinkable water, it should be separated from all microbes or germs which it may contain, whilst retaining its gases and salts. This important result has been lately reached, and this vital question is now settled for the benefit of the public health through the laboratory of Pasteur, the celebrated French scientist. The now universally known Chamberland filter, invented in that laboratory, has accomplished the problem.

This, Pasteur first made use of in order to isolate microbes from their breeding medium. It is made of an insoluble material very much like porcelain, although of a special composition; is unalterable by any chemical process; is baked at a very high temperature, and cannot be dissolved, nor give any taste to water or other liquids which pass through its pores. It is cylindrical in shape, closed at one end, with a small orifice at the other end.

The filtration takes place by the water passing, by pressure or by percolation, through the walls of this tube, from the outside to the inside, the filtered water escaping through the small orifice mentioned. On the exterior of the tube all suspended matter and germs of whatsoever nature are arrested, where they can be readily washed off, and the filtering medium restored to its original perfection.

THE ROCHESTER PARLOR HEATER AND IMPROVED OIL STOVE.

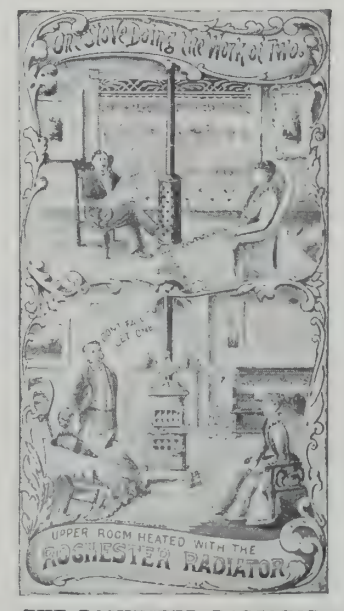
The Rochester Lamp Co., 42 Park Place, N. Y. City, having obtained a wide reputation for its excellent oil lamp, has adapted for use in a line of oil stoves the valuable features of the lamp—its central draught and perforated cone burner. Two of these stoves – the lamp heater and a combination oil stove—are shown in the accompanying illustrations. Instead of the old style smoking and bad smelling flat wick burners, these stoves have "the Rochester" round wick and perforated cone burners, and the Rochester draw bar or wick lift, rendering the stove clean, and the combustion perfect and odorless. The air is supplied to the burner through a seamless brass central draught tube, which keeps the oil cool, and the oil tank is all brass, holding a full gallon, and adapted to burn ten hours. The stove can be readily changed from a parlor heater to a cooker, and to a hanging or bracket lamp. It is finished in nickel, with the bands and heater ornaments polished; forming an extremely ornamental and stylish stove. A finely illustrated catalogue and circulars, giving prices and details, will be mailed free to applicants.



THE THATCHER FURNACES AND RANGES.—The Orange, N. J., *Chronicle*, speaking of these furnaces and ranges, says they have of late been more largely used in that section of New Jersey than anything else in the furnace line, and that they deserve all the success which they have been accorded, as they are made of the very best material, and combine all that skill and workmanship can make them. The extensive plant where these goods are made is situated in Newark, and the salesroom is No. 33 Peck Slip, New York. Those interested are invited to call and examine these goods, and compare them with other makes.

A STOVE-PIPE RADIATOR.

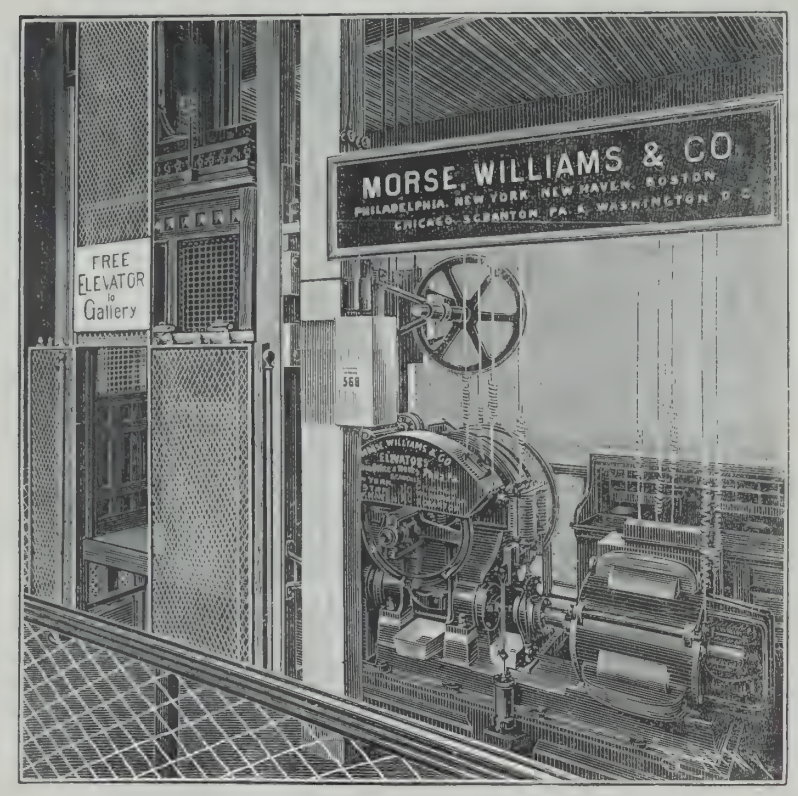
The illustration represents one of the most efficient means yet found of utilizing the heat ordinarily allowed to go to waste through the smoke pipe and chimney flue. By passing the pipe through another room to be heated, and replacing a section of the pipe with the radiator furnished by the Rochester Radiator Co., one stove is thus made to do the work of two. This radiator has 108 cross tubes, affording 3,300 square inches of iron, which take up and give out for useful heating purposes a large amount of caloric ordinarily passing off as a waste. The radiator may also be applied on a pipe within the room where the stove is situated, thereby correspondingly increasing the heating capacity of the stove. The Rochester Radiator Co., 268 State st., Rochester, N. Y., make these radiators.



THE ROCHESTER RADIATOR.

AN ELECTRIC PASSENGER ELEVATOR AT THE EXPOSITION.

An exhibit which won a medal for its superior merits and in a notable degree was made to serve the public convenience, while at the same time illustrating one of the most recent and valuable applications of electricity, is shown in accompanying illustration, and was made by Messrs. Morse, Williams & Co., of Philadelphia. The exhibit was well planned and located to permit the inspection of parts to a sufficient degree to afford an understanding of the working of this very simple and efficient passenger elevator, in which is employed the improved Hindley worm gearing, which has been made a specialty by this firm for years. The motor is attached to the worm shaft by means of a coupling, the shaft being provided with a powerful double shoe brake, which is released by the action of an electro-magnet and applied by a weight; so that in case the electric current should be accidentally cut off, the brake could be instantly applied to stop the machine. The brake also acts as a governor to check the descent of the car, should it attain too great a speed. The motor is of the low speed, multipolar type, with self-oiling bearings and carbon brushes, requiring a minimum of attention. The reversing switches and controlling apparatus are of simple and improved forms, their action causing the elevator to start easily and gently with and without a load. The makers claim that the average of current used, both in raising the load and lowering the empty car, is less than in any direct electric elevator in the market. The machines are designed to raise average loads at speeds as high as 250 feet a minute. Besides these electric elevators, the firm are also manufacturers and builders of hydraulic, steam, belt, and hand power passenger and freight elevators, as well as hoisting machinery, dumbwaiters, automatic hatch doors, etc.



THE WORLD'S COLUMBIAN EXPOSITION EXHIBIT OF MORSE, WILLIAMS & CO.

"Indoors" is the title of a richly illustrated quarto just issued by Messrs. Warren, Fuller & Co., designers and manufacturers of wall decorations, New York City, under the editorship of, and with a large portion of its very effective artistic work executed by, Mr. Samuel How. The scope of the book is a wide one, being intended to comprehend everything relating to the beautifying and decorating of house interiors, the author comparing our progress in this field with the ideal striven for and the best work in France, Germany, and England, and endeavoring to bring the highest ideals within the reach of the practical and utilitarian. The book has beautiful colored sketches of designs for the parlor, dining room, morning room, and hall, and a large number of exquisite patterns in wall papers, friezes, dadoes and ceilings, with ample letterpress description and comment intended to guide the purchaser in making such selections, considering the size and kind of rooms, furnishing, woodwork, etc., as will insure that harmony which alone can make a beautiful whole. The company were awarded, at the Columbian Exposition, the highest recognition for superiority of design and workmanship in connection with the manufacturing of wall papers and decorations.

Among the awards made by the Columbian Exposition is one to I. P. Frink, of 551 Pearl Street, New York, for Frink's Improved Reflectors. This device has been very largely adopted in halls, churches and picture galleries throughout the country, where it has given great satisfaction.

Wood-working Machinery at the Fair.

The exhibits of wood-working machinery at the World's Fair, Chicago, Ill., were the largest and most comprehensive ever made at any exposition. That of the Egan Company, of Cincinnati, Ohio, stood pre-eminent in the number of machines displayed, and in the decidedly novel characteristics possessed by them. This concern has had a most successful career, originating and introducing much time and labor saving machinery of the highest efficiency. In every case wherein its machinery has been entered for competition in all of the great expositions of the country it has carried off medals for perfection of operation and excellence of construction. At Chicago it has had granted to it many awards and distinctions. Special mention has been made by the judges of the splendid mechanisms brought forward by the Egan Company, that show so magnificently the ingenuity of the American mechanic.

We take the following from the report of the chairman of Awards Committee: "I recommend the issue of medal and diploma for the well-selected display of a series of wood-working machines of advanced modern construction in the whole and detail of parts shown, as well for their perfect working and action, and in addition thereto for their finish, which is in accordance with the highest state of the art." Here are a few of the machines which were given the medal and diploma: Improved Universal Wood-Worker; No. 10 Double-Cylinder Planer and Smoother, with broken roll and broken chip-breaker; No. 6 Band Resawing Machine, average capacity 40,000 feet per day; Triple-Drum Sander, with patent brush attachment; Timber-Dressing Machine, with eight powerful feed-rolls; No. 3 Reciprocating Scroll-Sawing Machine, with differential strain; Car Gaining and Tenoning Machine, etc., etc.

The Dixon Company.—The judges at the World's Fair made awards to the Joseph Dixon Crucible Co., Jersey City, N. J., for superior products in graphite, lead pencils, plumbago, crucibles, blacklead stoppers and nozzles, dippers, bowls, foundry facings and lubricating graphite. These awards are a very proper recognition of the qualities of these goods, as the Dixon Company is known throughout the world as the pioneer in the graphite industry, and its goods are always considered as the standard. The United States Government in its bids for supplies says, "Dixon's, or equal."

E. T. Barnum, Wire Works, of Detroit, Mich., had for an exhibit at the World's Fair a large house made of ornamental wirework, and fitted it with wire and iron goods of his manufacture. This was a novel idea and made his exhibit very attractive. Mr. Barnum received the highest award upon steel prison jail cells or lock-ups and grocers' cheese safes, and also an award upon his general exhibit.

Sandpapering Machines.—A handsome illustrated catalogue with this title has just been published, and will be sent free to applicants, by Messrs. J. A. Fay & Co., of Cincinnati, Ohio. All users of wood polishing machines desirous of obtaining the best labor savers, and those capable of producing the most perfect surfaces, will do well to send for this catalogue.

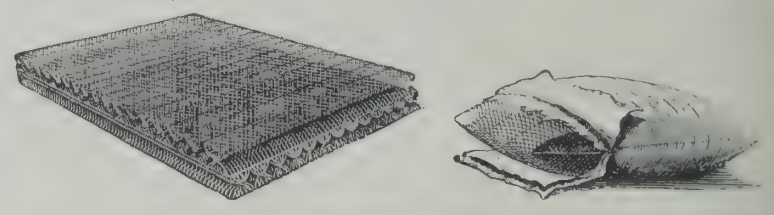
The Sykes Steel Roofing Co., of Chicago, Ill., and Niles, Ohio, have been awarded medal and diploma at the World's Columbian Exposition on their "Sykes Patent Cap" Steel Roofing.

A New Building Material.

The new kind of building material, some time since announced as a proposed substitute for ordinary stone or brick, is now receiving special indorsement on account of its freedom, under various and repeated tests, from the usual liability to crack or fracture. To insure this property, with the other essential adaptations, silicic acid is used, powdered, and cleansed from all impurities; 5 to 10 per cent. of this is mixed in warm river or rain water, and this is applied to slaked or well burnt lime or added to hydraulic lime, the resulting product being mixed with sand and small portions of fluorspar. This mixture is cast into moulds in various shapes as may be desired, and, after removal, the castings are left to dry from 12 to 24 hours, which brings them to a condition as dry as atmospheric air; in this state they are brought into a steam boiler, and steam blown through so as to drive out all air, after which the boiler is hermetically sealed up and steam let in under a pressure of ten atmospheres. In this high pressure steam bath the stones remain for 48 to 72 hours, afterward being submitted to a bath of boiling and saturated chloride of calcium for 6 to 12 hours, also under a pressure of about ten atmospheres in the same boiler, and the condensed water may be used for the bath. The stones are allowed to dry in the open air, or, more quickly, by circulating steam inside the boiler after the chloride of calcium has been withdrawn and prior to taking out the stones.

TORSION BRAIDED WIRE MATTRESSES, PILLOWS, CUSHIONS, ETC., SHOWN AT THE EXPOSITION.

The articles shown in this exhibit presented a degree of novelty and utility that caused them to attract much attention, and to receive the highest award. They are the product of a comparatively new manufacture, originating in the invention, in 1882, by Dr. Henry Weston, of Philadelphia, of the cylindrical braided wire pillow. The successful application of the principle was not attained without further costly experiment, and the invention, by Mr. Joseph L. Wells, of the braided wire torsion spring, by which perfect resiliency is obtained, and whereby pressure on any part and to any degree causes the wire to twist instead of bending or breaking. Mattresses, pillows, cushions, etc., made according to this improvement afford a gentle, softly-yielding support, but they do not become heated, as is the case when they are filled with feathers, hair, moss, or other material, for each slight movement changes the air beneath, and they do not absorb odors, become musty, or retain perspiration or disease germs. The mattresses and pillows are covered with a light covering of fine curled hair or other material, which may be removed for cleaning when necessary; but there is little to attract bugs, moths, or other insects. The wire is heavily tinned to resist rust, and the articles are all well made of so excellent a quality of steel wire as to be practically indestructible. The best known doctors and surgeons in the country have written very strong testimonials as to the superiority of these goods for hospital service, and for general use their adaptation is equally obvious. In warm weather, especially, they constitute a positive luxury. These goods are made only by the Weston & Wells Manufacturing Company, 1110-1116 Noble Street, Philadelphia, Pa.





THE WORLD'S COLUMBIAN EXPOSITION—EXHIBIT OF THE WESTON & WELLS MANUFACTURING COMPANY, OF PHILADELPHIA, PA.



BROWN'S
PATENT SEAMLESS
DRAWN COPPER HOUSE
BOILERS.

Cannot collapse. Will not leak.

Ordinary boiler tested to 200 lbs.

Extra heavy tested to 300 lbs.

Made of two seamless drawn copper shells.

Handsomest, best and strongest in the market.

Send for circular, giving instructions for prevention of accident.

MANUFACTURED SOLELY BY

RANDOLPH & CLOWES,

PROPRIETORS OF

The Brown & Bros. Tubing and Boiler Works, and the Brown & Bros. Brass and Copper Rolling Mills.

WATERBURY, CONN.

Manufacturers of Seamless and Brazed Tubing.

F. W. DEVOE & CO.

(Established 1852)

PURE MIXED PAINTS

We desire to call attention of consumers to the fact that we guarantee our ready mixed paints to be made only of pure linseed oil and the most permanent pigments. They are not "Chemical," "Rubber," "Patent," or "Fireproof." We use no secret or patent method in manufacturing them by which benzine and water are made to serve the purpose of pure linseed oil. Sample cards, containing 50 desirable shades, sent on application.

FINE VARNISHES,
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BETZ BUILDING,

WILL H. DECKER, Architect.
The most magnificent building in Philadelphia.



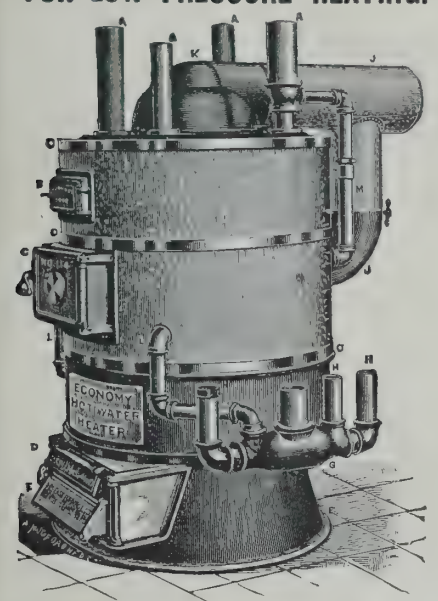
IN a building of this character, of course, only the best of materials are used: Hence the adoption of the GARDNER SYSTEM of hanging windows WITH RIBBONS.

No other can compare with it.

Send for catalogue, containing half tone etchings of one hundred of the finest buildings in the world, all using the GARDNER RIBBON. Sent free if you inclose four cents in stamps, for postage, and mention "SCIENTIFIC AMERICAN."

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CHICAGO, ILLINOIS.

FOR LOW PRESSURE HEATING.



Three Sizes, Nos. 110, 114 and 118.

THE ECONOMY
Hot Water Heaters

ARE THE BEST OF THEIR CLASS.

SEND FOR CATALOGUE OF

Economy Hot Water Heaters,
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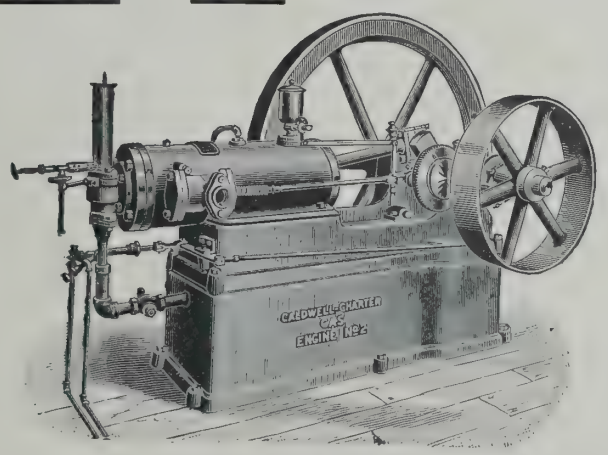
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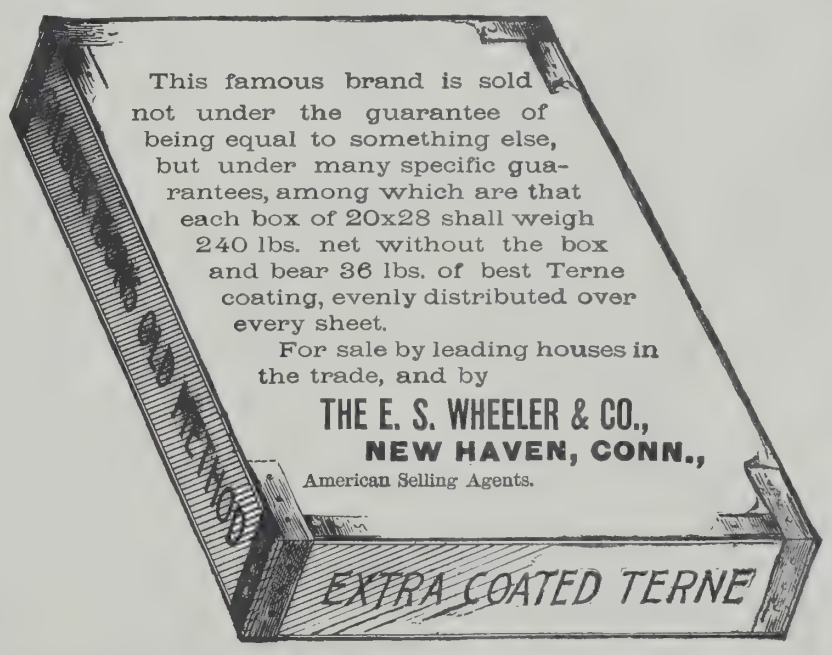
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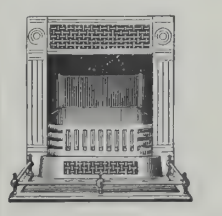
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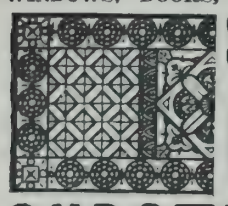
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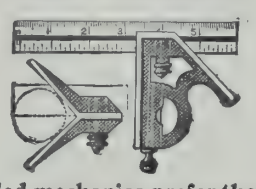
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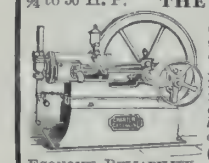
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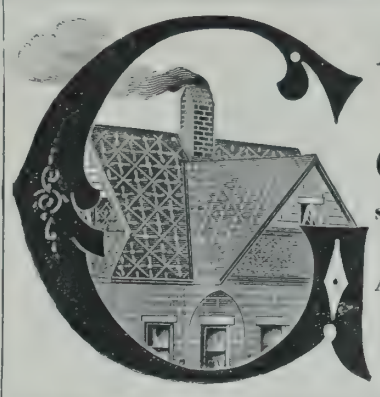
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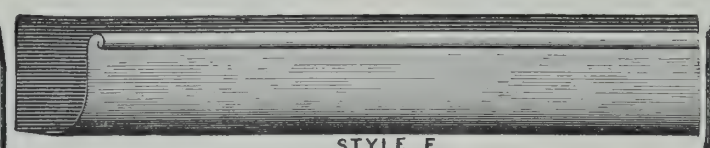
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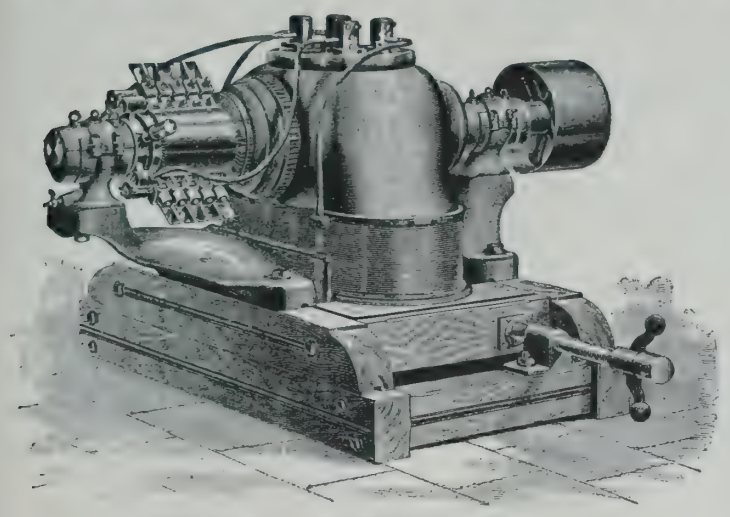
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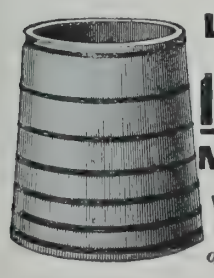
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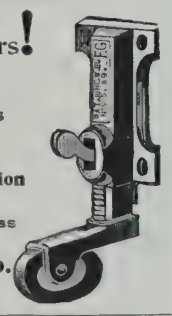
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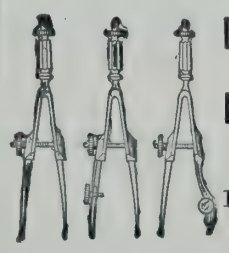
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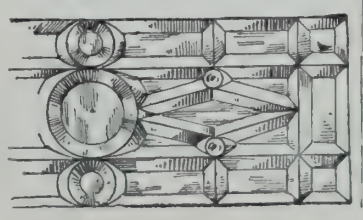
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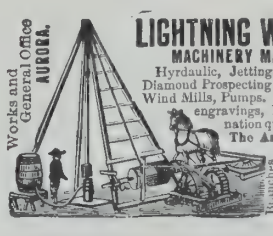
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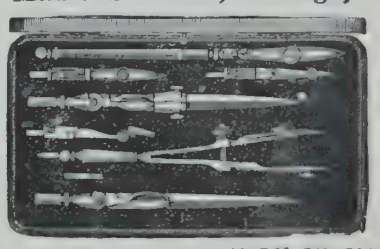
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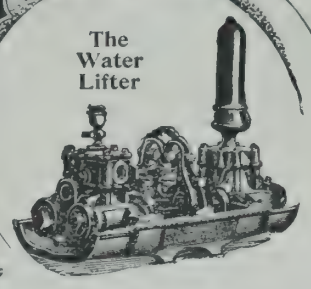
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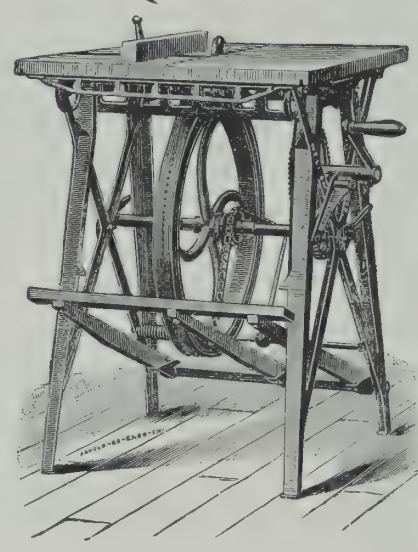
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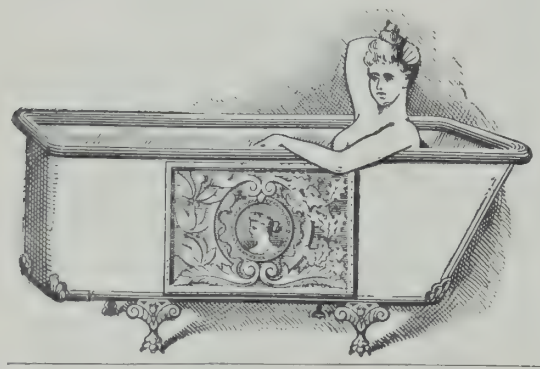
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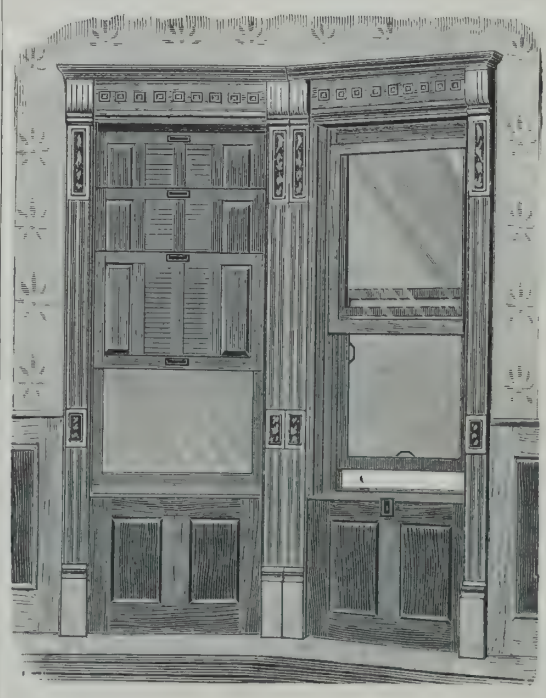
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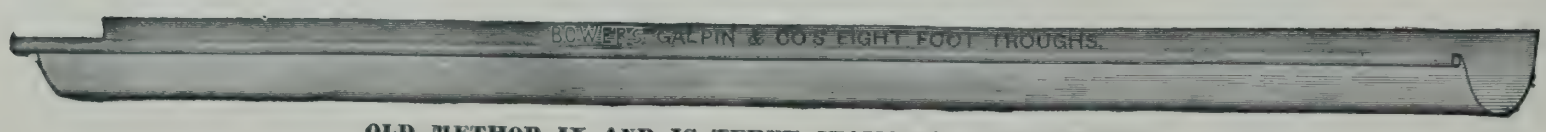
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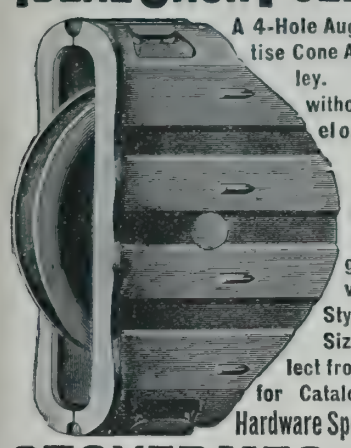
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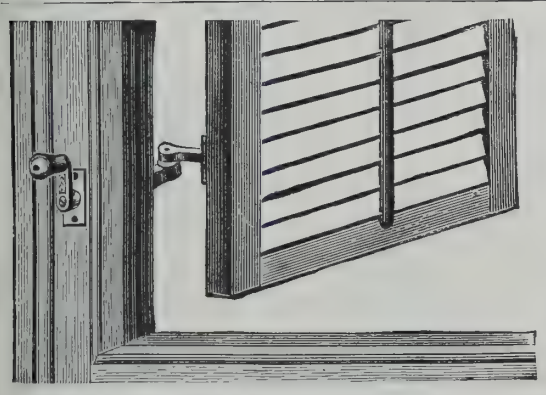
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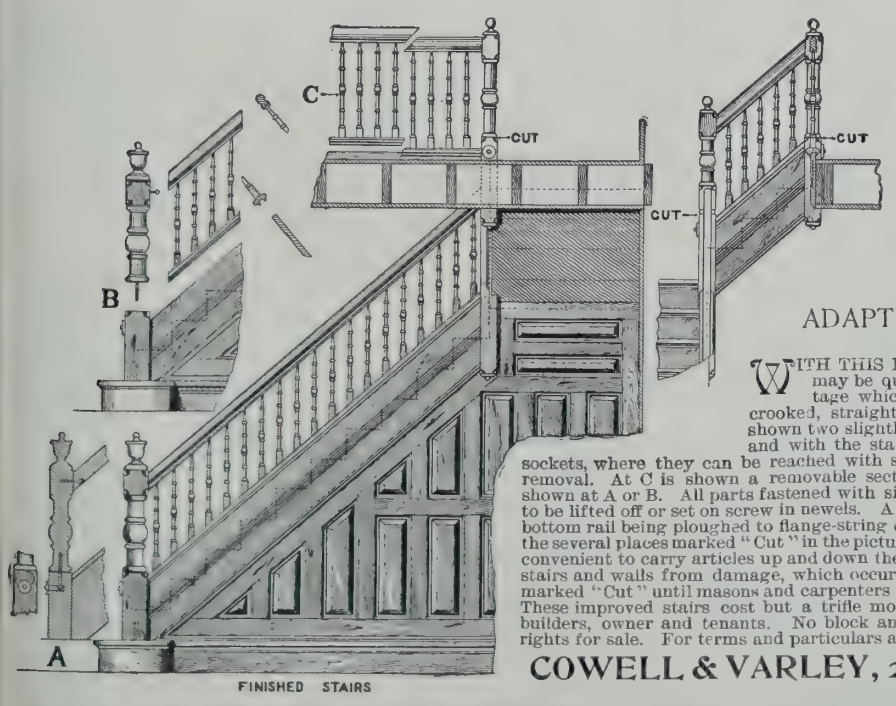
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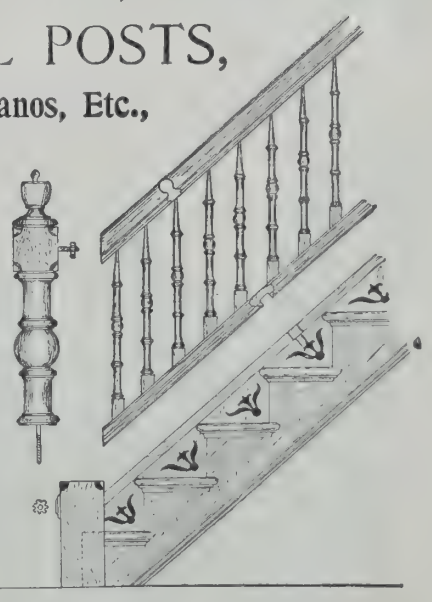
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(*Continued from page* iv.)

any objection in forcing water uphill to have the pipe follow the undulation of the ground, or must it be a gradual rise to the highest point, a distance of 1,500 feet? A. There is no objection to following the ground grade in laying a water pipe, provided it is well protected against frost and plugs put in at low points to facilitate drainage if required.

(5) D. C. writes: We are located in the vast gently undulating prairie, and have fine spring water, generally found in the slight depressions. Often we need to locate the origin of these springs, but find it next to impossible. Will you kindly instruct us how to, without extensive digging? Except for these gentle undulations, we must go one or several miles from the spring to find an elevation of 50 to 100 feet above them. A. The slight depressions in the land where springs occur are only the seepage points from the local surface water of the immediate neighborhood. It is seldom that they have a deep origin, although considerable elevation of land at a moderate distance will add to the flow of springs along the valley lines of depression of the land.

(6) S. T. writes: I have a house painted and sanded. It has at least 8 coats of paint and sand on it. It has begun to blister. Will you please let me know the best way to get the paint off the woodwork so that I can repaint it and make it look nice? Some of our painters here say burning is best. That is a very slow process. Would it not be best to take it off with some kind of acid? A. Probably the burning process is best and quickest. The blowpipe burner with a broad flame should be used, and with a broad scraper the paint will be quickly removed. Potash lye may be used, but is not so satisfactory as burning.

(7) E. P. W. writes: I wish to know the exact horse power it will take to pump water in a suitable sized cylinder, with an opening of one-half inch constantly open, and maintain a pressure in cylinder of one thousand pounds pressure per square inch. Will a dynamo of one hundred horse power run an electric motor of one hundred horse power? Suppose they were side by side, what loss would there be in horse power between dynamo and motor? A. You will require 12 horse power in maintaining the jet under the pressure named. The friction of a pump to do the work will require at least 4 horse power more, or 16 horse power in the steam cylinder of the pump. There will be from 10 to 15 per cent. difference in the horse power of the two motors as described.

(8) W. C., Wichita, asks: Can soft pine floors be polished to look like hardwood, so that rugs may be used instead of carpets, and how? A. Soft pine if freshly laid makes a good surface for polishing, and according to the selection of the wood by its grain may be made quite ornamental. A floor that has been used should be made perfectly clean, and if possible planed. Then a coat of boiled linseed oil, well rubbed into the floor and dried, gives a good surface for wax polishing, which may be made by dissolving a half pound of beeswax in a quart of turpentine. With this rub the floor to a polish with a hard brush or a coarse flannel rubber.

(9) N. L. asks: What solution is best to preserve wood from warping or drawing when exposed to rain and weather? A. Nothing better than thorough oiling with linseed oil to keep wood from warping.

(10) W. O. S. asks how the windows of a store can be kept clear from steam in cold weather. A. In order to have clear glass in show windows, the air behind the glass must be of about the same temperature as the outdoor air. The windows may be made completely clear by a second window to com-

(*Continued on page* viii.)



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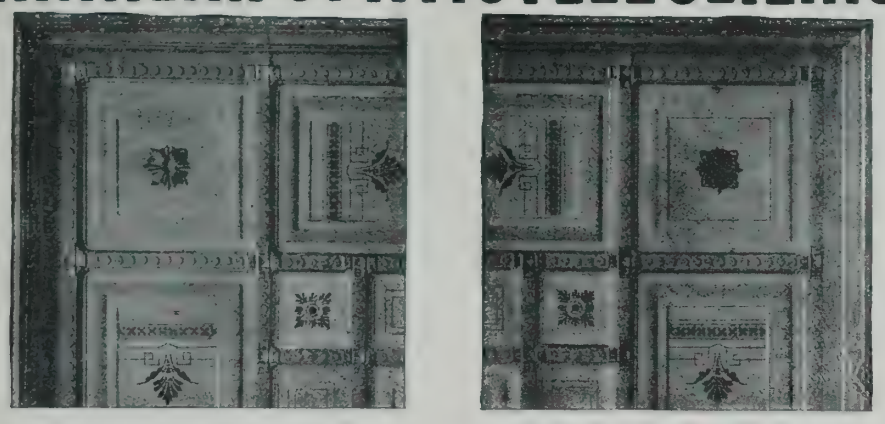


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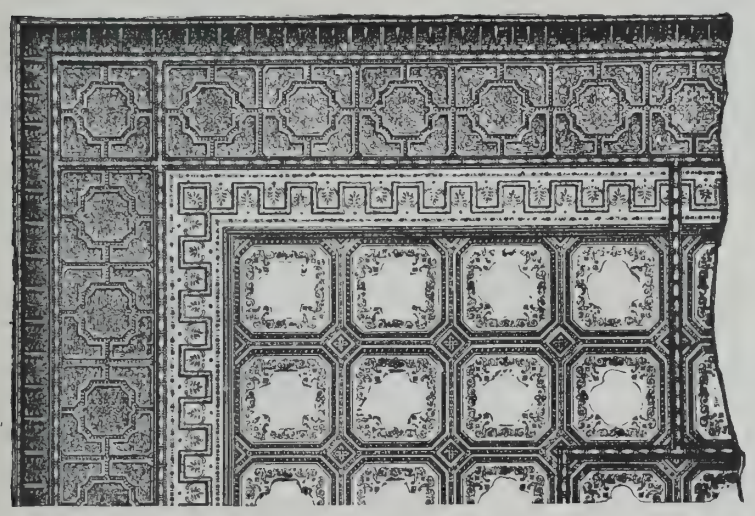


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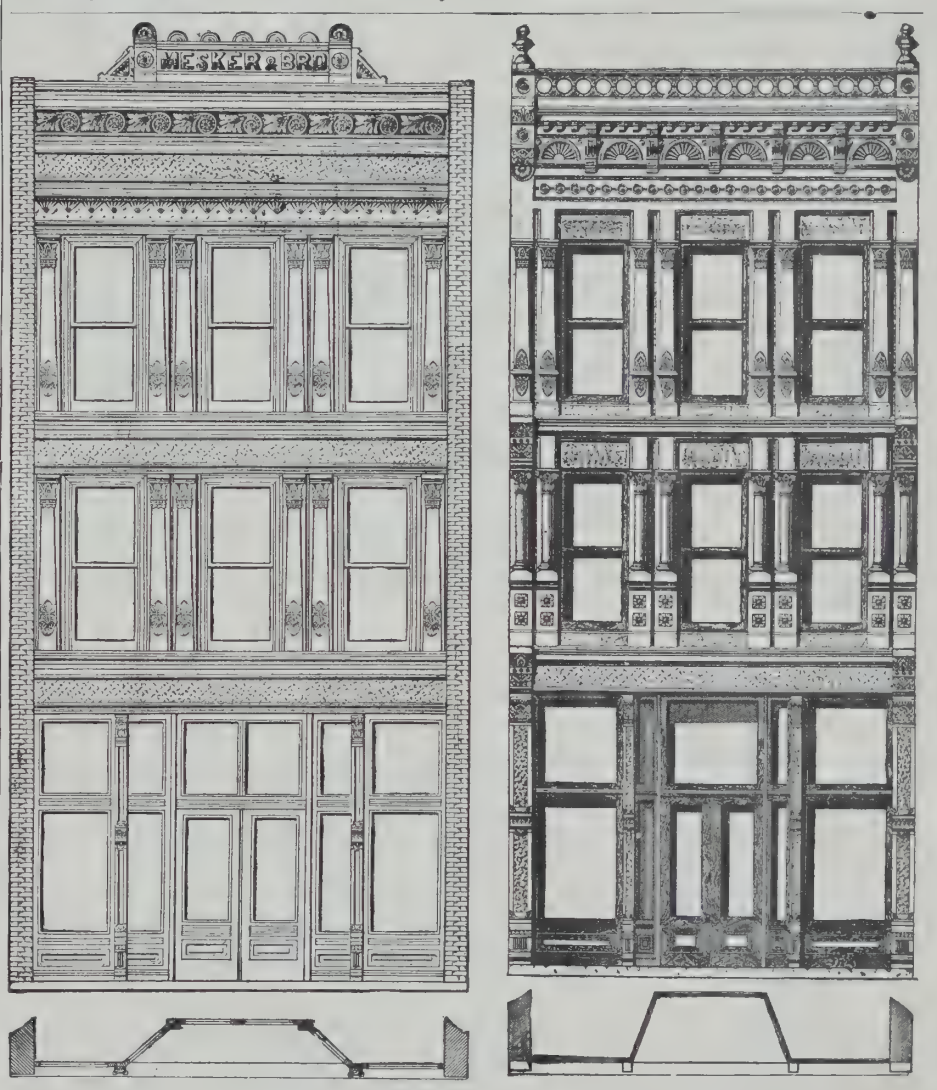
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(*Continued from page* vi.)

pletely inclose the show window back of the goods. The inclosure to have small ventilators at bottom and top, which can be closed when necessary to prevent the entrance of dust.

(11) A. H. writes: Please inform us what the standard rule is as to the number of cubic feet to a ton of ice. A. Solid ice is 38½ cubic feet to the gross ton, or 34½ cubic feet to the net ton. Ice in storehouse packed solid 42 cubic feet and 38 cubic feet respectively per ton.

(12) J. C. A., Jr.—A good cat in your cellar or garret would probably soon rid your house of rats and mice, but if you prefer trying some other means, we would suggest baiting the rats and mice for a few days in one place, and afterward placing a trap of approved construction in that place, when you will probably be able to clear the house.

(13) J. McR. asks: What is my best plan to erect building for storing stone lime to prevent slaking? A. Lime if to be stored for any length of time should be packed in tight barrels in a dry atmosphere or as soon as drawn from the kilns, and placed in a building that if made for the purpose should stand entirely clear of the ground, with a clean wind sweep under it, and so arranged that the storage room can be opened free to the air when dry, and closed when the atmosphere gets moist or in rainy weather.

(14) J. J. K. writes: A says that the sharp cracking sound heard in steam pipes when steam is turned on in the morning is caused by the water remaining in the pipes, which is the condensed steam of the night previous. B contends these sounds are produced by the rapid expansion of the pipes in consequence of the steam rushing through them, and that the water produces only a low gurgling sound, which may be heard at any time steam is turned on. A. The cracking or hammering in steam pipes is made by the surging of the water of condensation from the steam. It may be water that has remained over night in the pipes if they have not been thoroughly drained, or the water condensed in cold pipes, which condenses the steam very fast when first turned on. The hammering may also occur at any time by neglect in properly providing for the drainage of all the pipes in the supply and return as well as the coils or radiators. The mere passage of the steam only causes a whistling noise, and the expansion and contraction of the pipes cause no noise whatever, unless a very great length of pipe drags on a solid fastening or support.

(15) E. P. W. asks: What horse power engine would it take to drive a pump forcing water into a cylinder under a pressure of one thousand pounds to the square inch, the cylinder having an opening or discharge pipe of ½ inch in diameter, the opening of ½ inch to be open all the time and the pressure to be maintained at 1,000 pounds? A. You will require 12 horse power for maintaining the pressure as stated.

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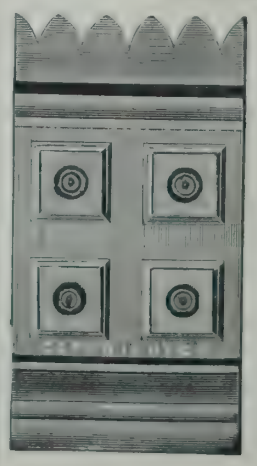
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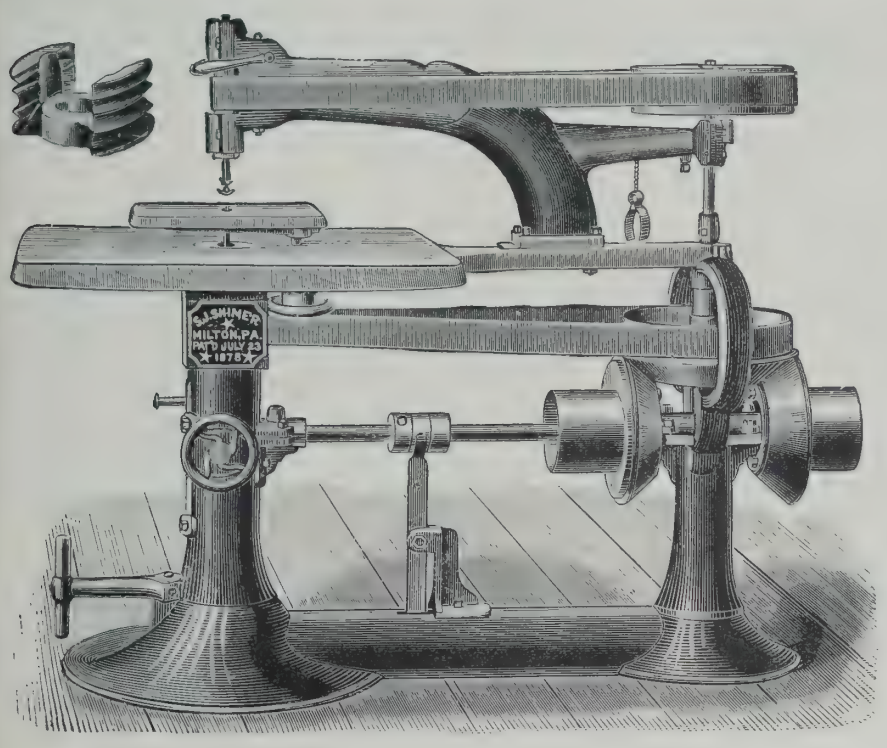
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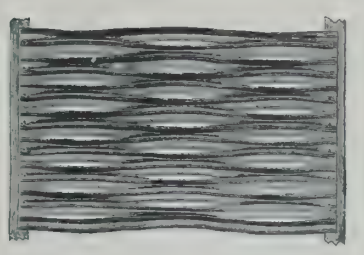


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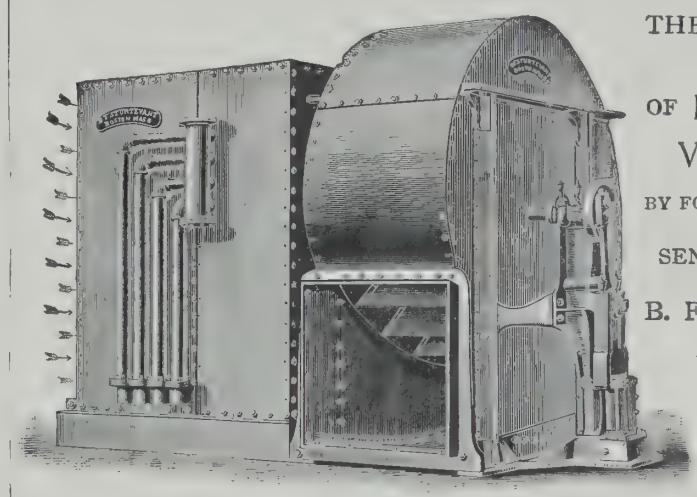
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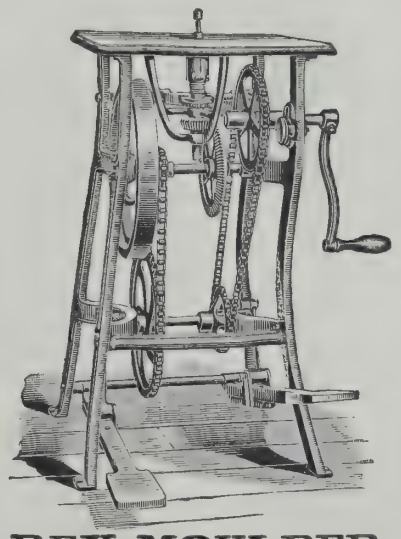
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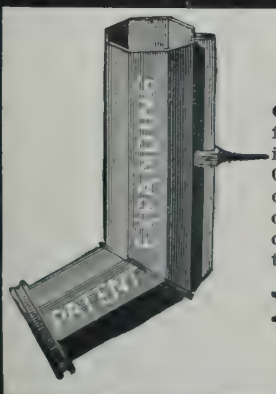
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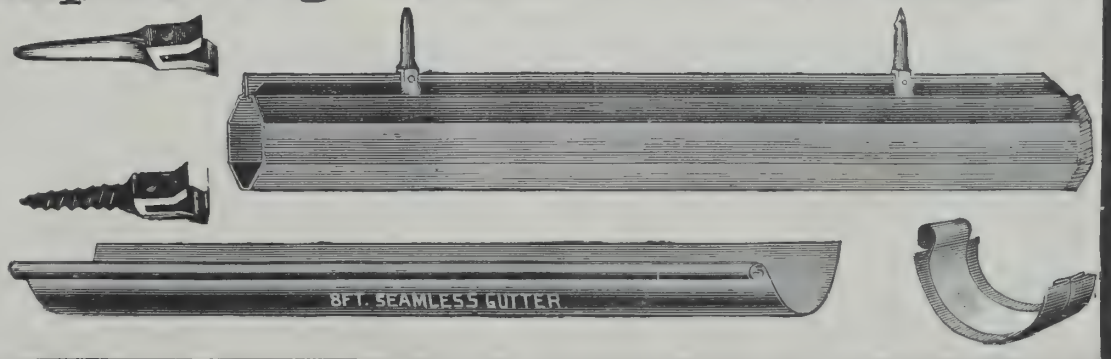
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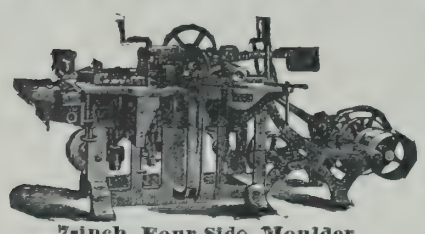
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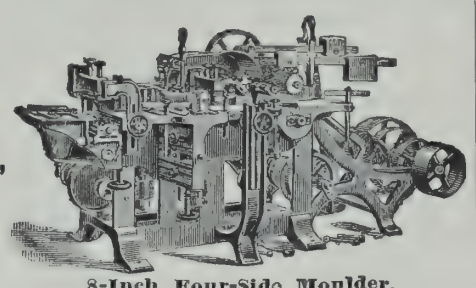


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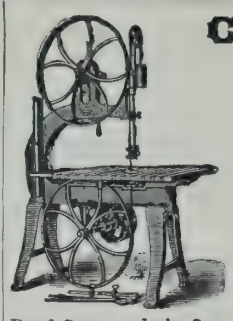
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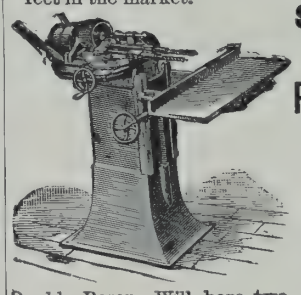
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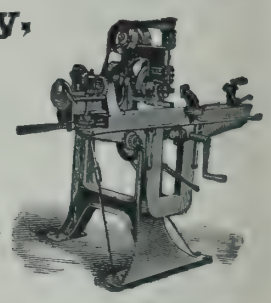
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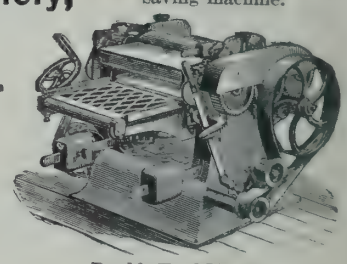
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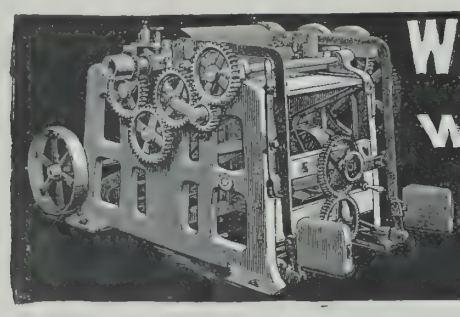
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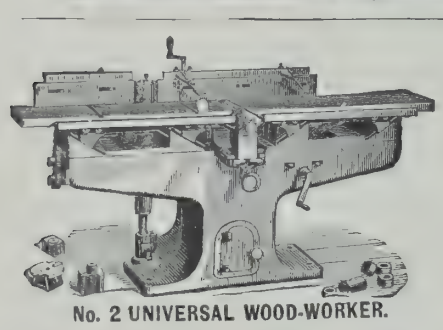
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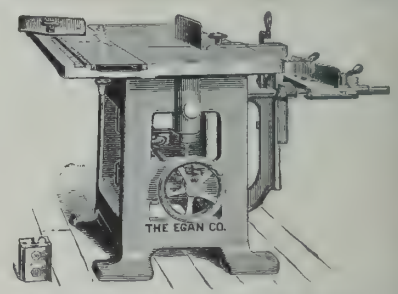
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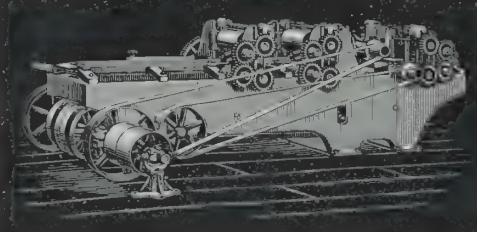
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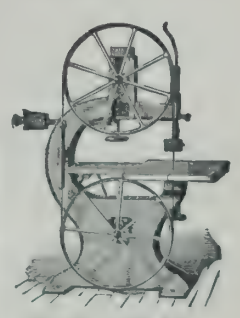
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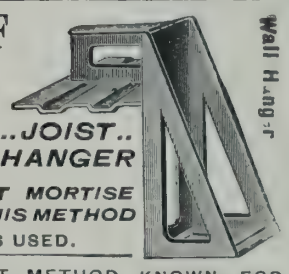


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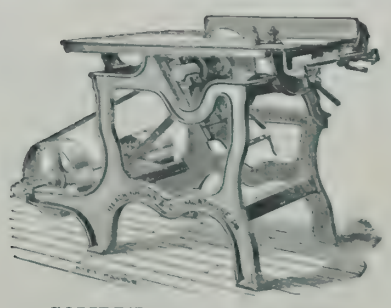
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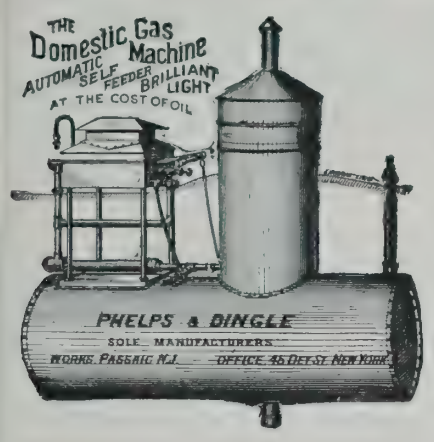
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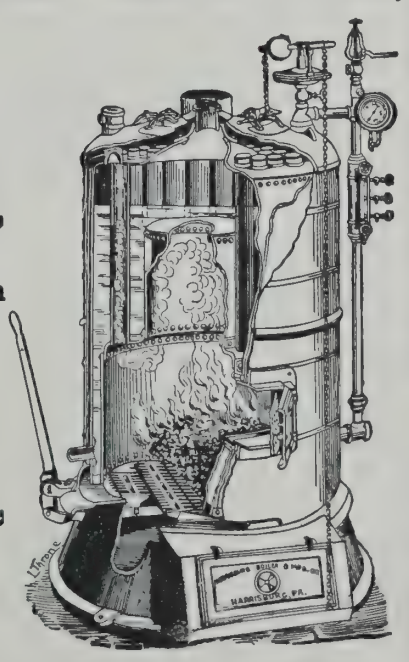
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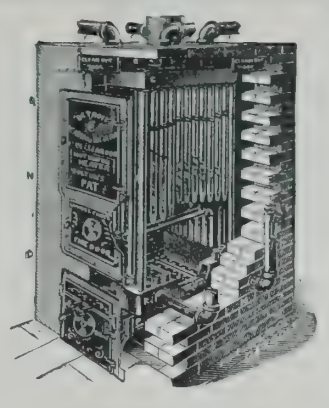


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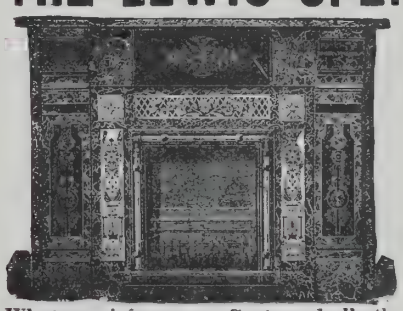
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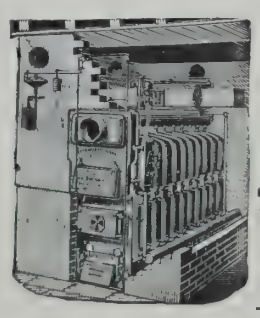
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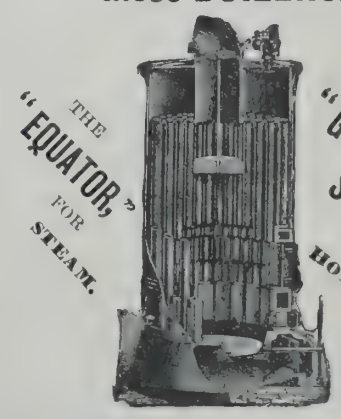
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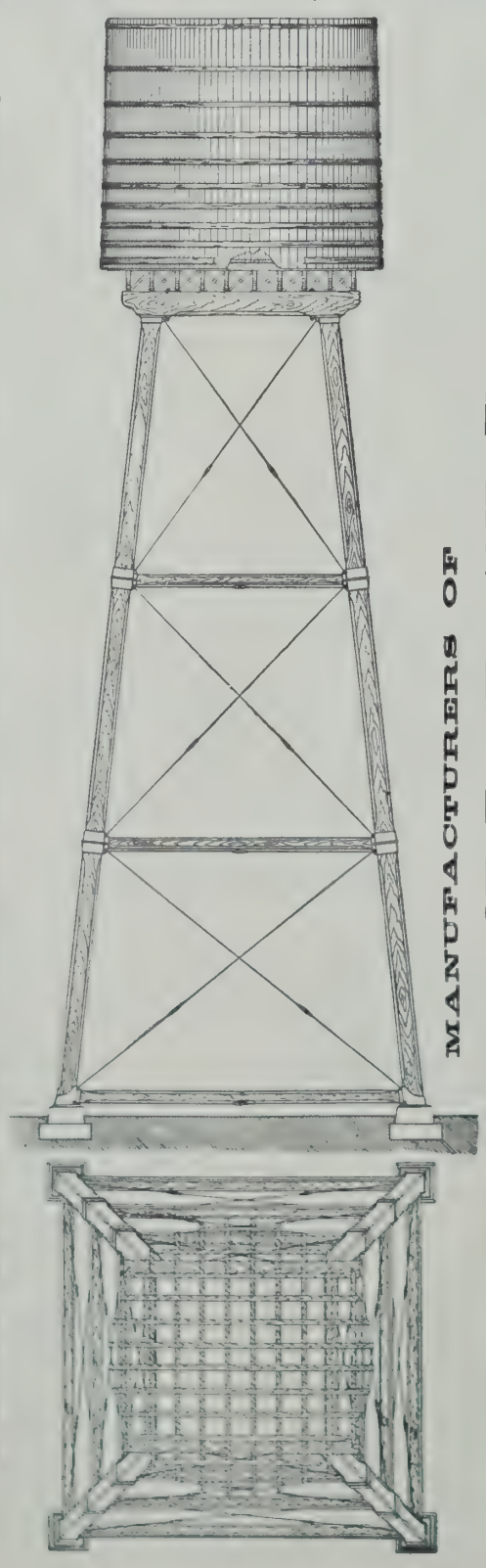
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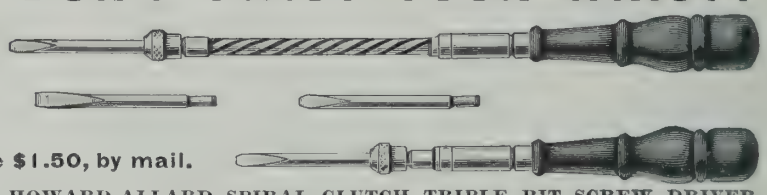
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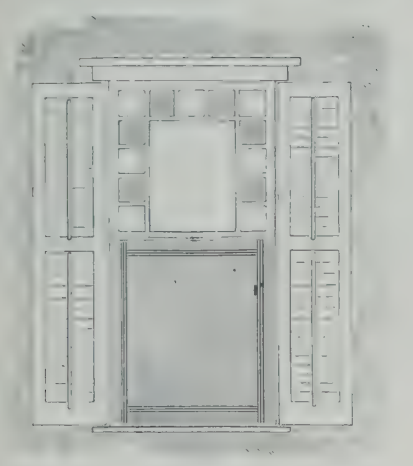
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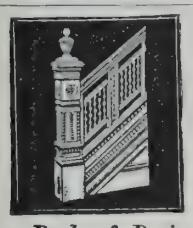
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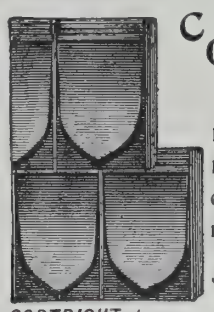
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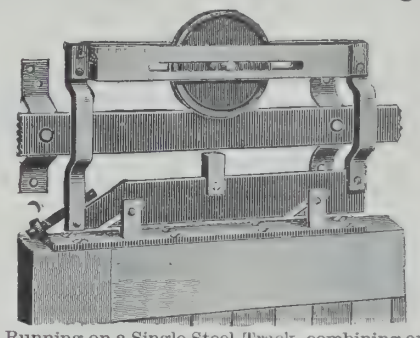
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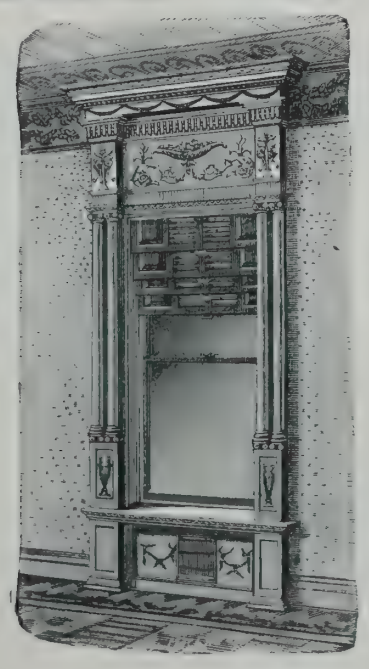


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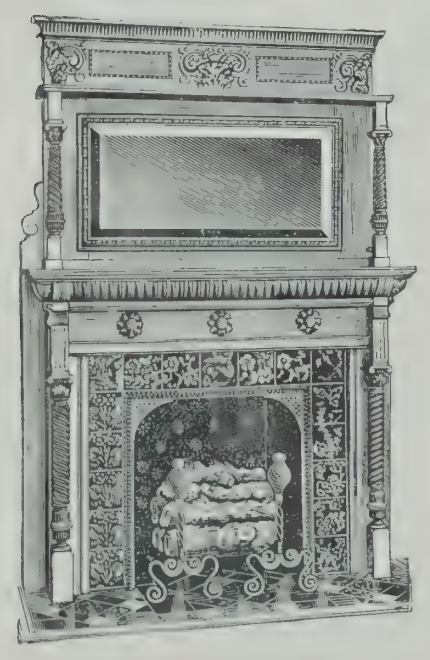
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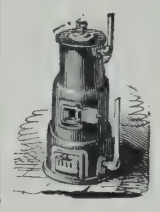
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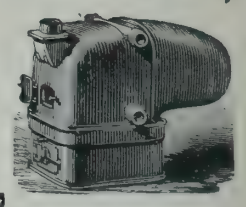


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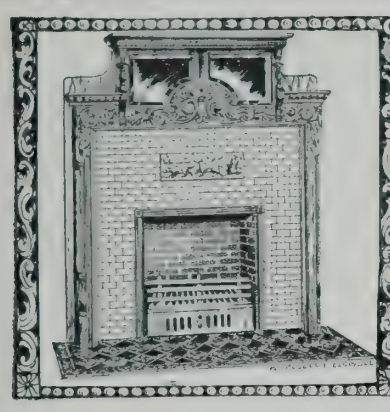
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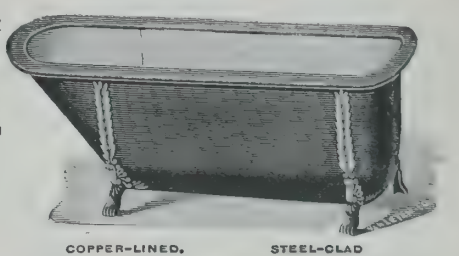
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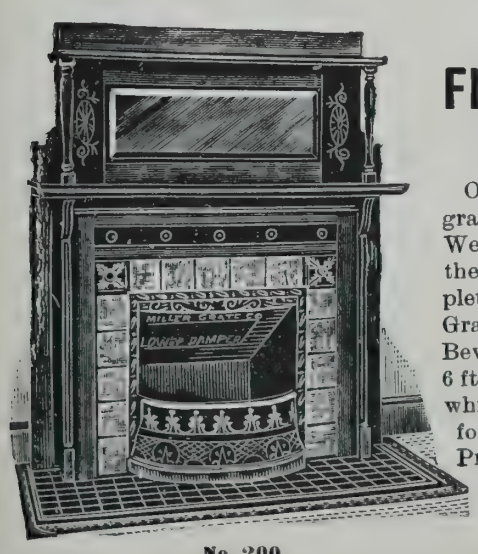
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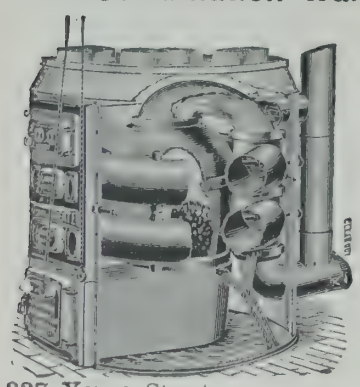
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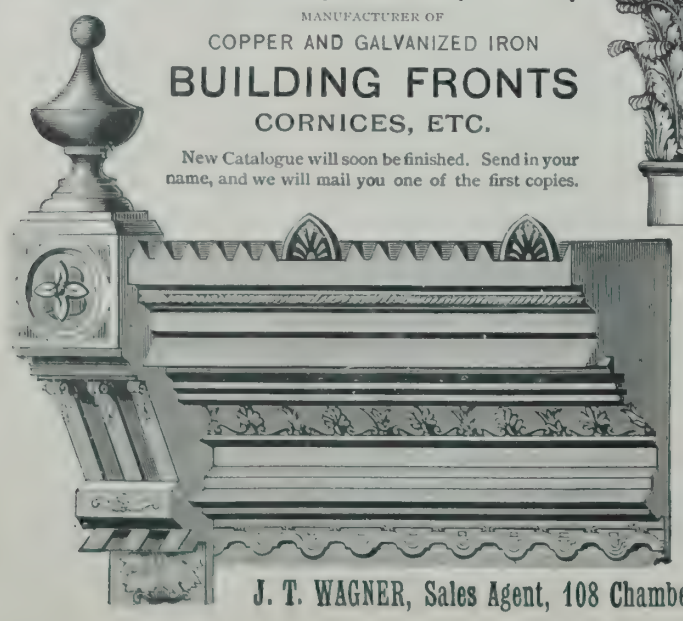
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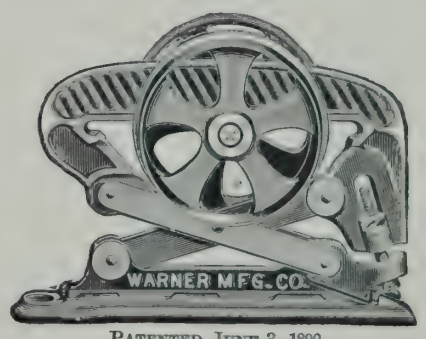
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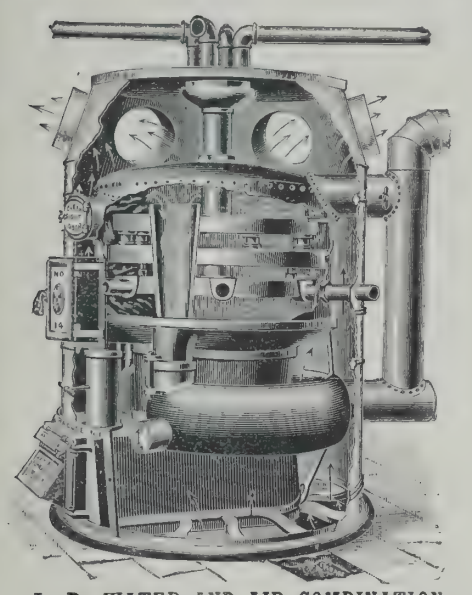


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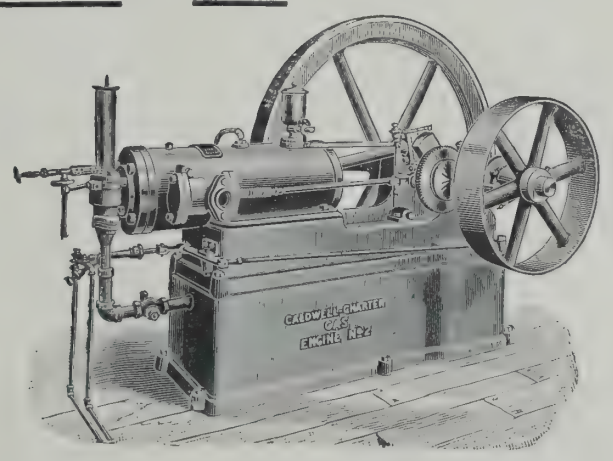
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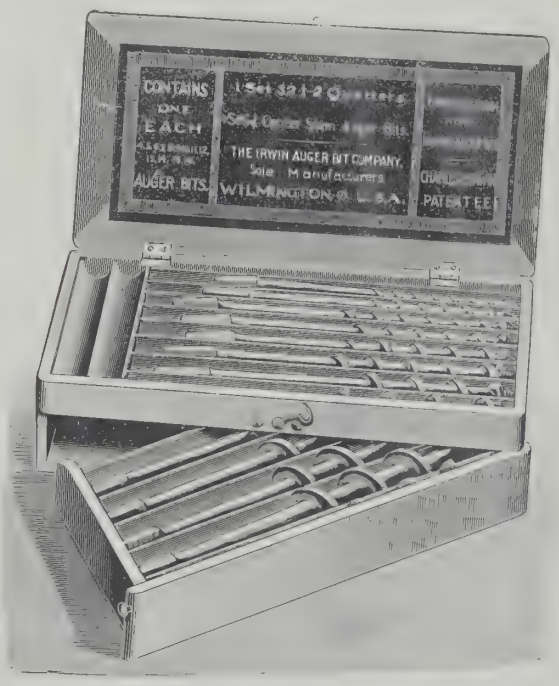
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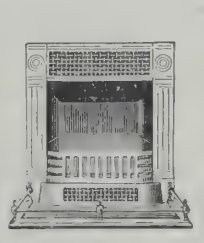
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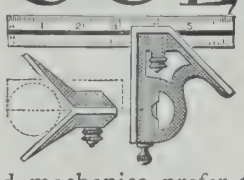
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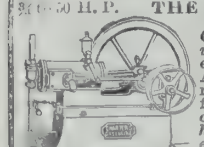
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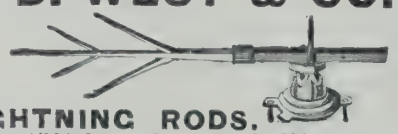
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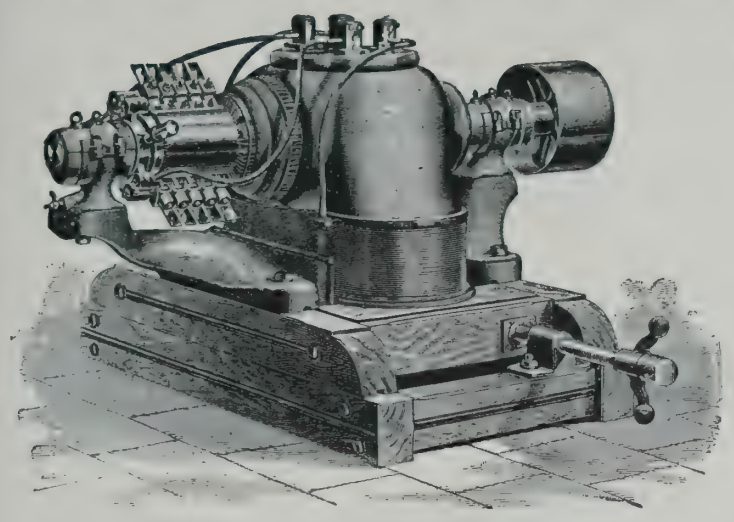
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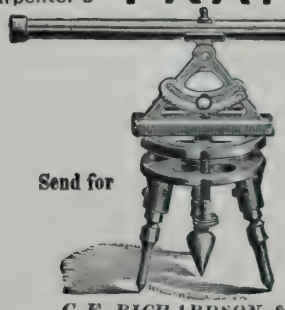


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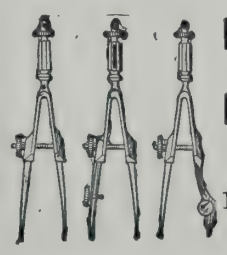
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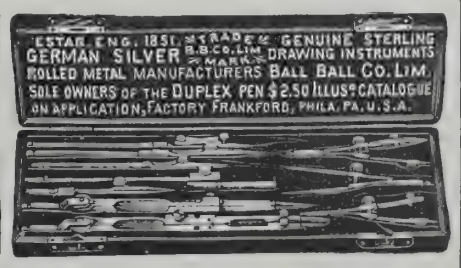
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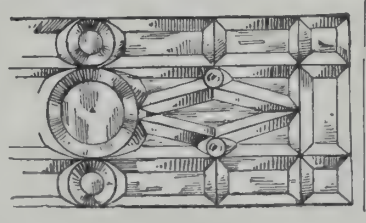
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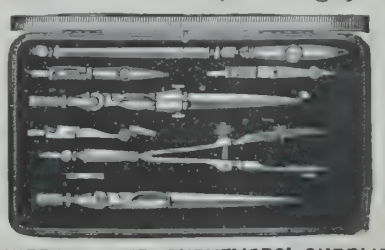
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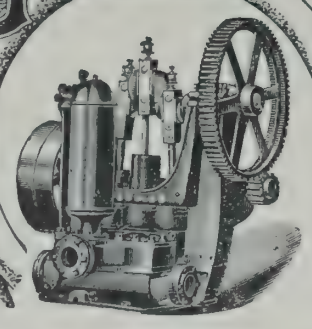
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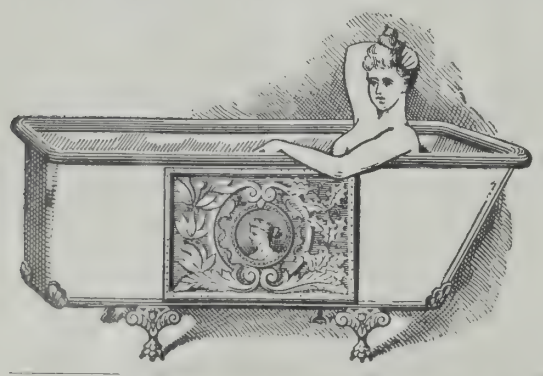
(3) H. K. asks the best paint for the inside of an iron kitchen sink, something that will prevent the sink from rusting. Ordinary paint washes from the iron, allowing the water to come in contact, causing rust spots. A. A kitchen sink of cast iron in daily use requires no paint. Keep it clean, and the grease in the dish water will keep it from rusting. There is no paint that will stick.

(4) P. & T. write: We wish to get some device for raising the water from the side of a cañon on to a "mesa," or elevation, about 100 feet above. Can you suggest the best and cheapest method? A. If you have or can make a fall of 6 or 8 feet for the driving pipe of a ram, we would recommend a ram as the most reliable and cheapest appliance, having the advantage over a windmill in running constantly.

(5) S. P. asks: 1. What is the usual way to fix railings, grilles, etc., in concrete, in brick, or stone? What materials are used, how mixed and applied? A. Lead is generally used for fastening railings to stone. Holes drilled from 3 to 4 inches deep. Spuds or posts roughened at bottom, lead poured and calked when cold. Pure Portland cement makes a good fastening for bricks, stone, or

(*Continued on page* vi.)

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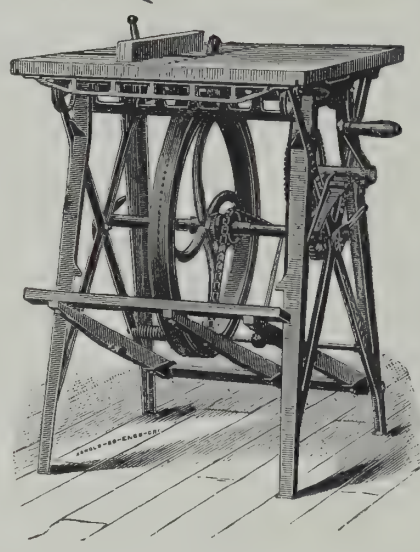
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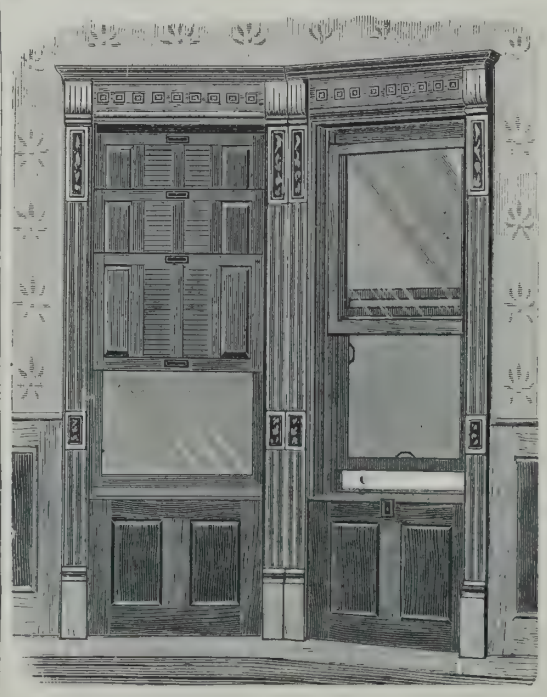


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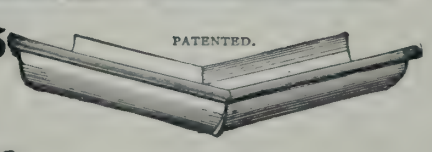
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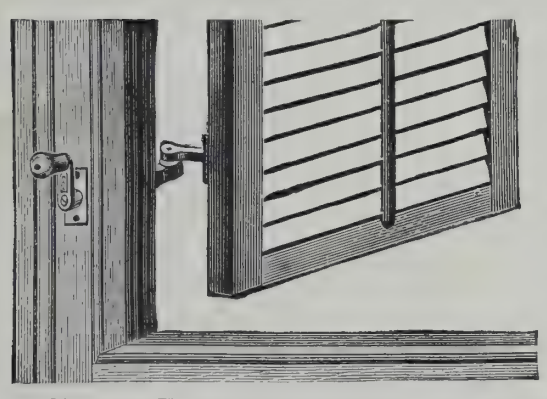
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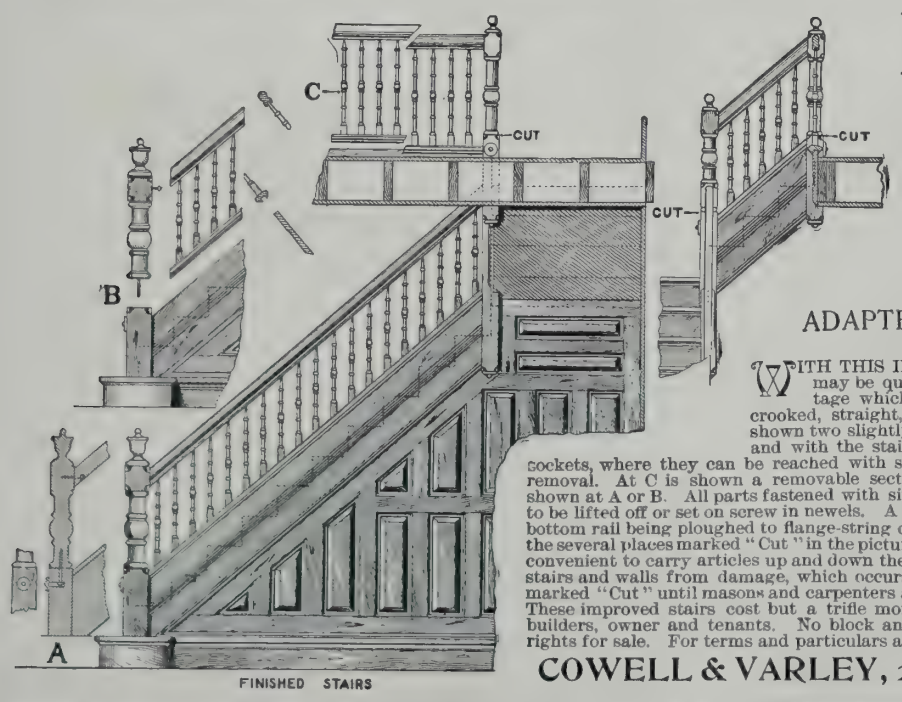
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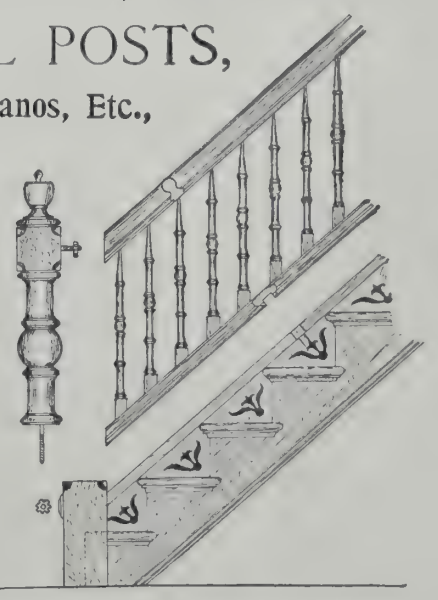
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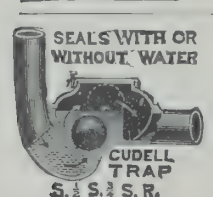
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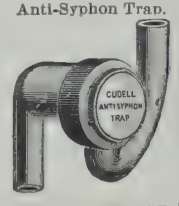


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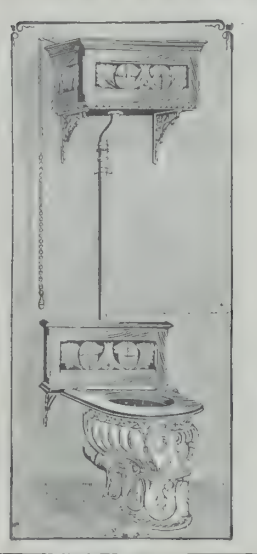


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(*Continued from page* iv.)

concrete, only requiring a little deeper setting, say 5 or 6 inches for stone and 6 to 8 inches for brick and concrete. The Portland cement should be mixed thick and driven in with a tamp. 2. Is there anything that can be applied to wood to make it impervious to water under pressure say of 150 pounds per square inch, as water pipes for instance? A. Wooden water pipes can be made impervious to water by immersion in hot asphalt for a few minutes and the asphalt drained out. Hot paraffine may also be used, but does not penetrate the wood as well as asphalt. 3. Suppose I wish to convert decimals of small denomination as 0·0001265 into the metric system, as equivalents, what should I call it? I find nothing lower than a millimeter. A. The reduction of a decimal value of any unit into a metric unit is made by multiplying the decimal by the ratio of the metric value to the primary unit value; so if your decimal is of one inch, your multiplier will be

$$\frac{1}{0{\cdot}03937079} = 25{\cdot}4 \quad 25{\cdot}4 \times 0{\cdot}0001265 = 0{\cdot}0032131 \text{ of a millimeter.}$$

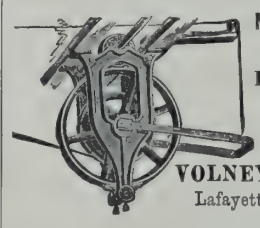
4. What is lapping and how is it done? It is a finish, I am told, after grinding fine work in machine, etc. Are there any books on grinding and lapping published? A. Lapping is truing a surface on a flat wheel, which may be of metal charged with fine emery, or on the flat side of an emery wheel. See "Hand Book for the Artisan, Mechanic and Engineer," by O. Byrne, $5 mailed. It has a full description of polishing and lapidary work.

(6) R. G. says: I have a lead lined drinking tank, 4x6x6, which leaks. Have tried everything possible to stop it, but the hole cannot be found. What varnish or paint not injurious could be put on, in order to fill up the holes? A. Clean the tank out thoroughly and dry it. Paint the inside with Prince's metallic paint (red oxide of iron) and boiled linseed oil, and let it get fully dry before using.

(7) J. C. W. writes: Please explain the following: During the present cold spell, many of the water pipes in our dwelling houses have been frozen, and singularly enough the hot water pipes were oftener closed than the cold ones, where hot and cold water were in use. Upon inquiry I find that this was not in isolated cases, but very generally, and in many instances the hot and cold pipes lie together. A. The heating of the water expels the air, which is often seen to sputter from the hot water faucets. Water without air, or from which air has been expelled by heat or otherwise, freezes slightly easier than aerated water.

(8) J. E. S. writes: 1. I have a well 140 feet to water, which is inexhaustible. By going 40 feet deeper we find dry sand, which absorbs all the water unless plugged below the water line, or we stop drilling before we get through a very hard rock that lies directly on top of the dry sand bed. Can I raise the water with a hydraulic ram? Give instructions for putting in. If not, is there an automatic apparatus that will raise the water? A. You cannot raise water from bored well with a ram, unless by enlarging it, you can sink a pipe through to the absorbing stratum below, to carry off the water used to work the ram and create the necessary pressure. There are oil and gasoline engines and air engines used for pumping water from wells. They all require care. A windmill will be the best automatic machine. 2. Does the moon revolve on an axis as the earth does? If so, why is it the same spots face us all the time? A. The moon makes one revolution on her axis in the same time that she makes one revolution around the earth, and that is the reason why the same parts face us all the time. 3. What shades the moon or causes its different phases? A. It is the reflection of the sun's light on the moon that makes her appear to vary in form. 4. How near has any of the

(*Continued on page* viii.)

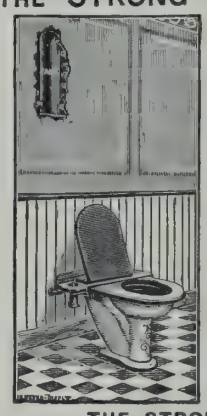


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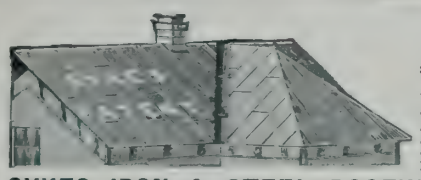
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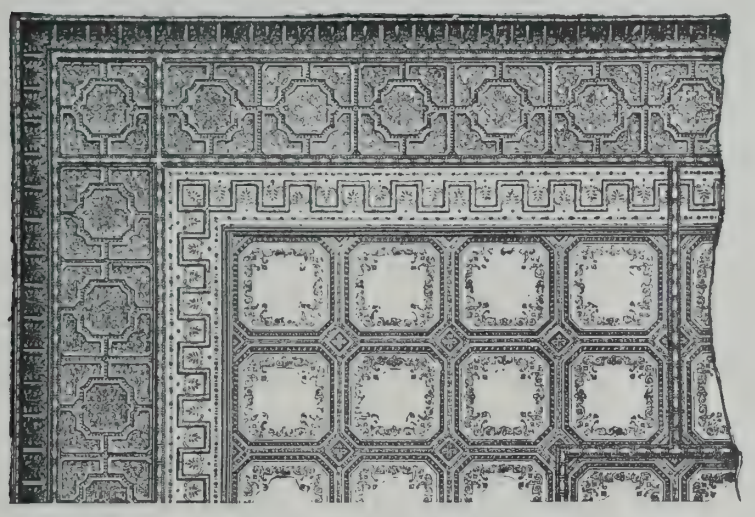


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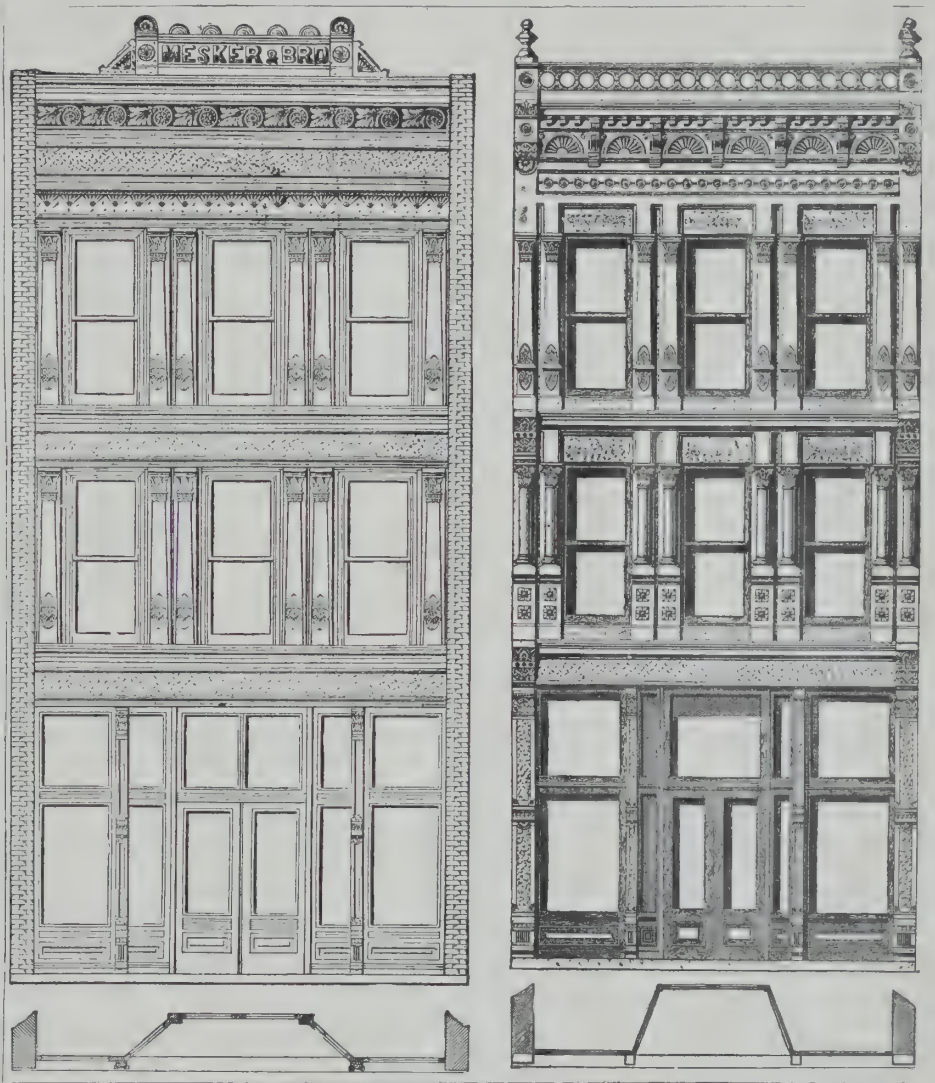
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(*Continued from page* vi.)

heavenly bodies ever been to the earth, and what is the nearest to the earth at present? A. The moon is the nearest heavenly body. She is 240,000 miles distant from the earth. 5. What body or bodies will cause the eclipse of the sun April 16 and October 9, and their distance from the earth? A. The moon coming between the sun and the earth produces an eclipse of the sun.

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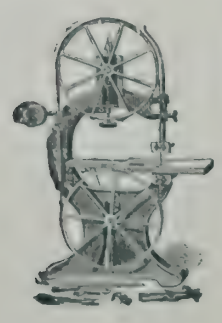
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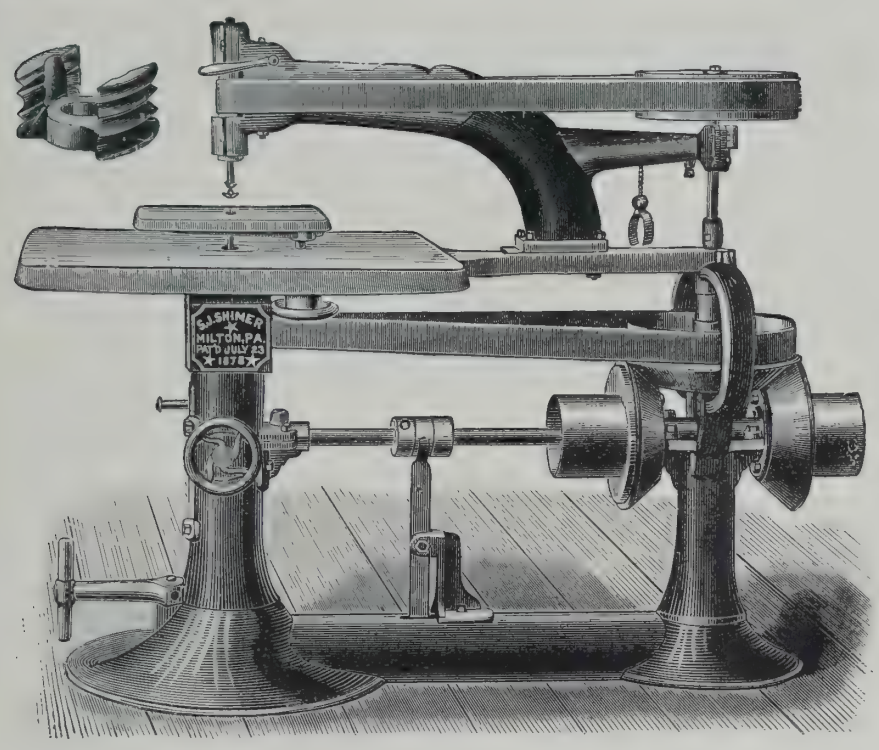
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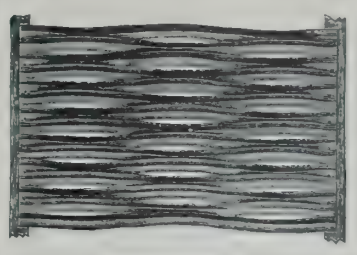


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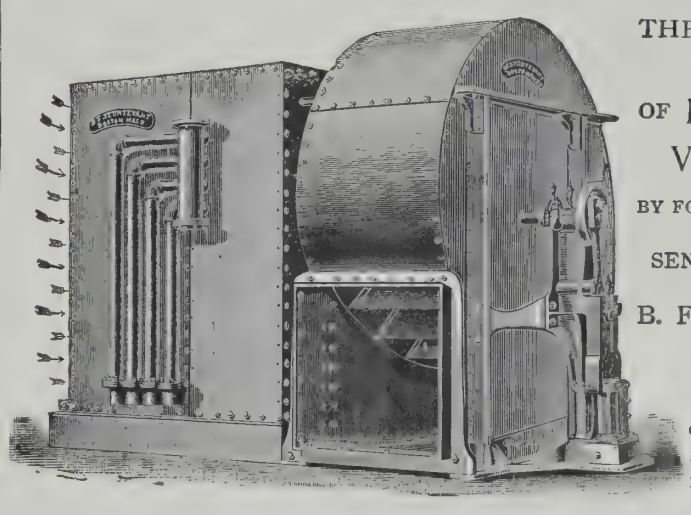
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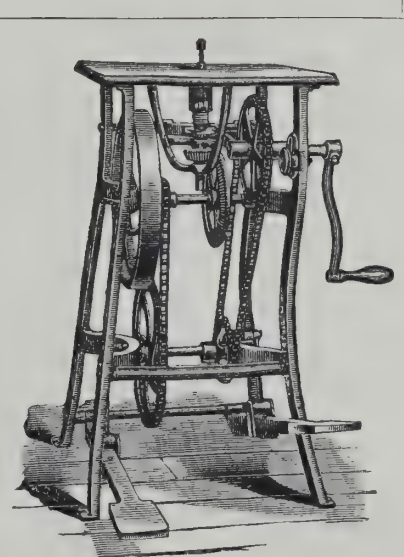


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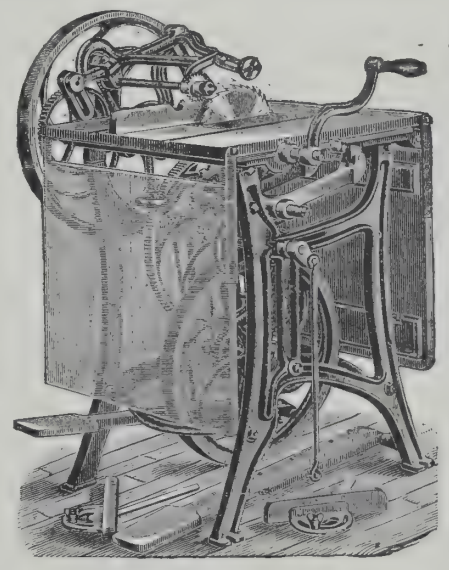
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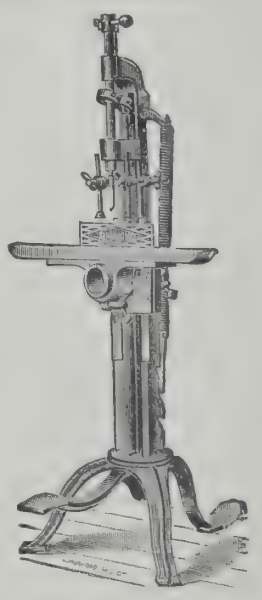


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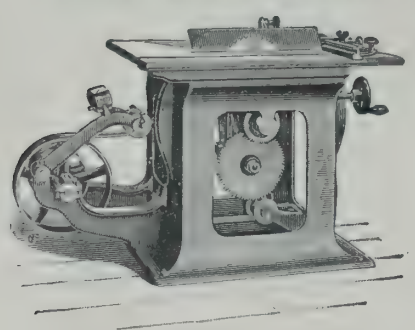
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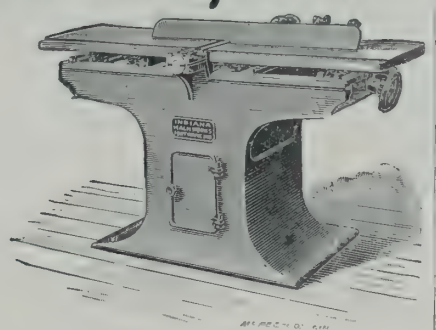
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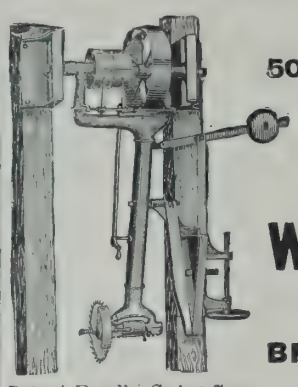


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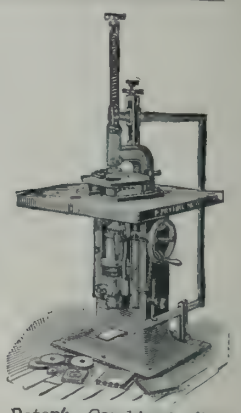
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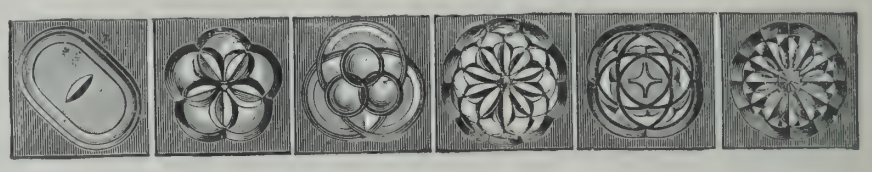
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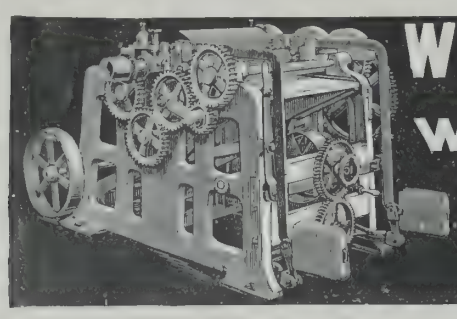
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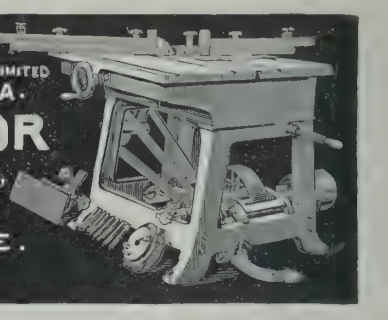
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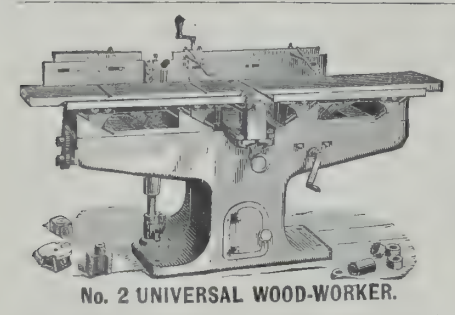
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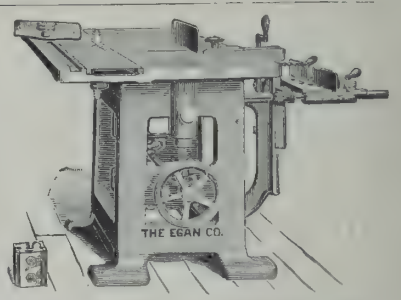
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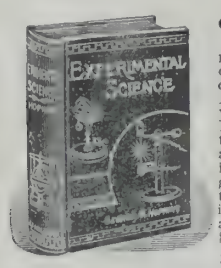
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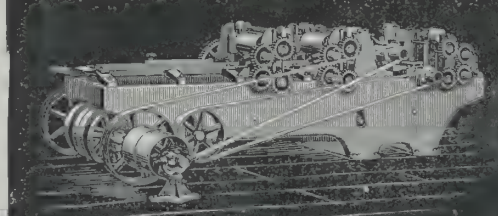
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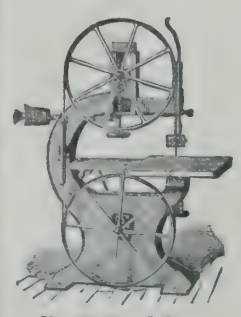
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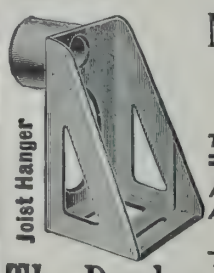
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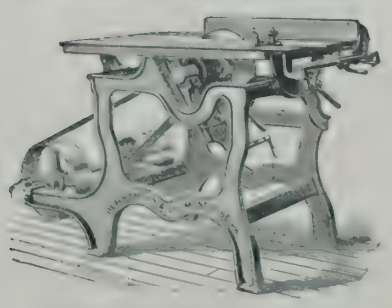
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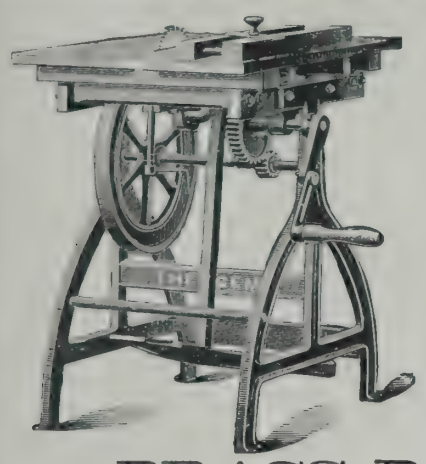
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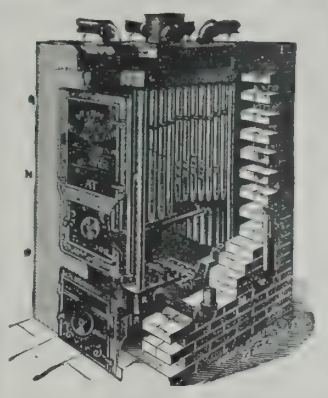
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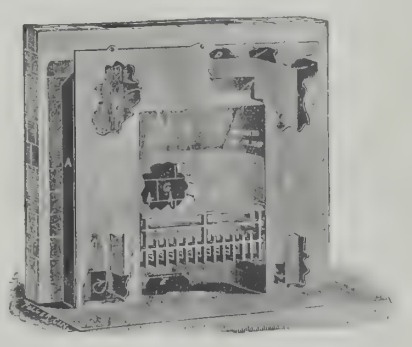


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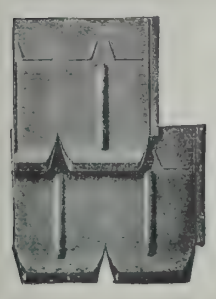
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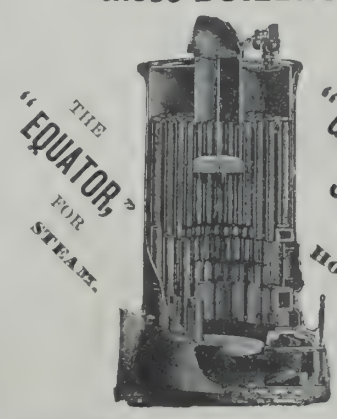
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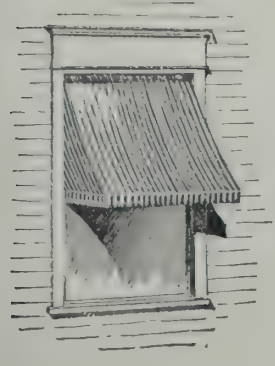
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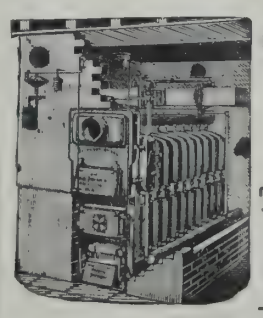
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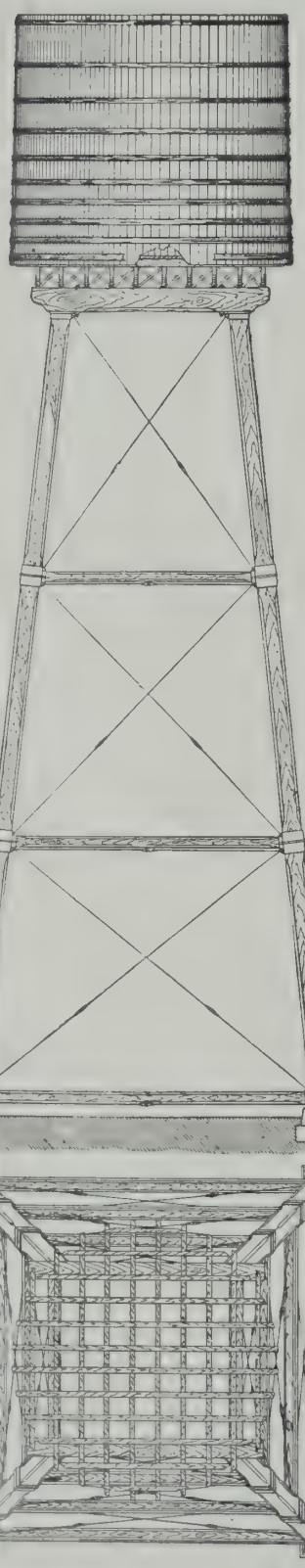
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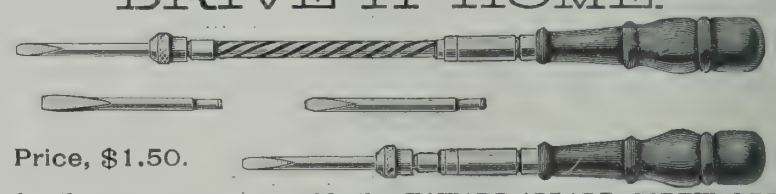
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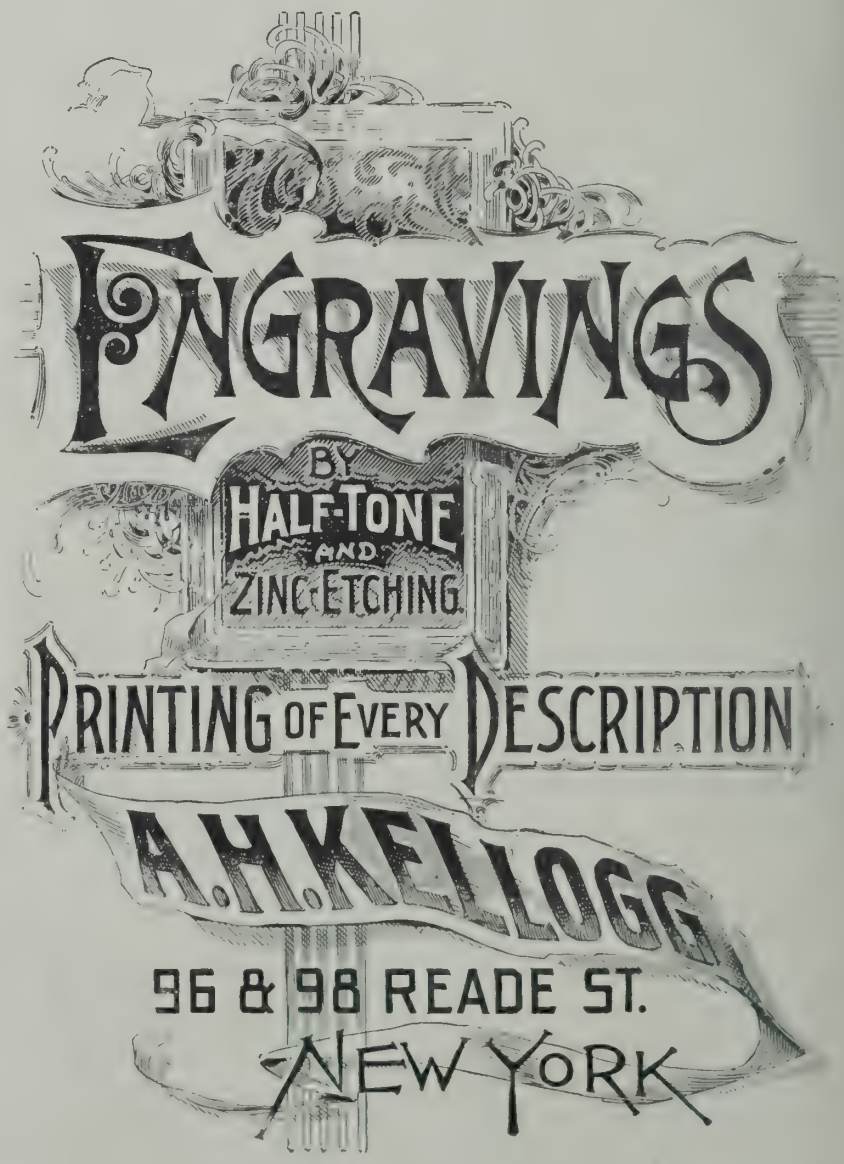
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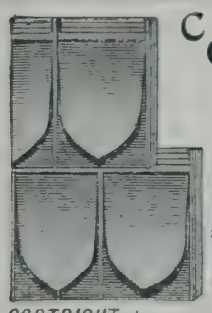
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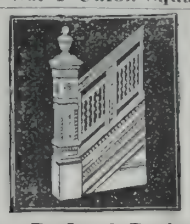
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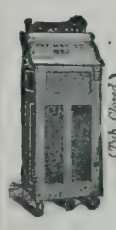
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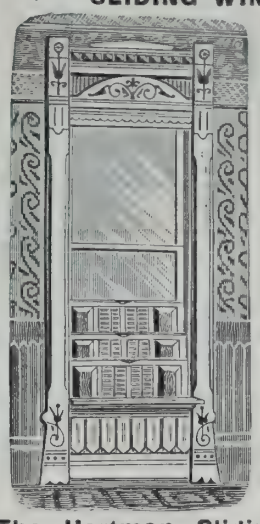
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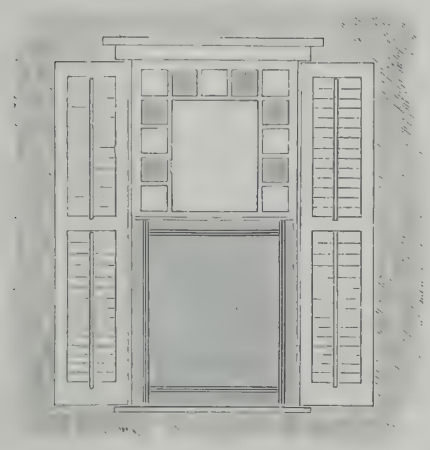
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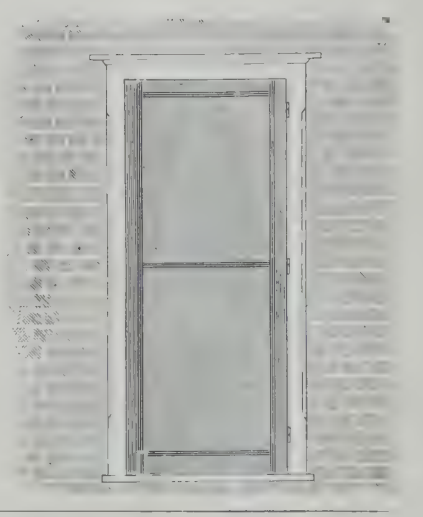
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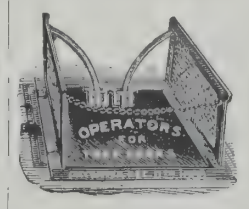
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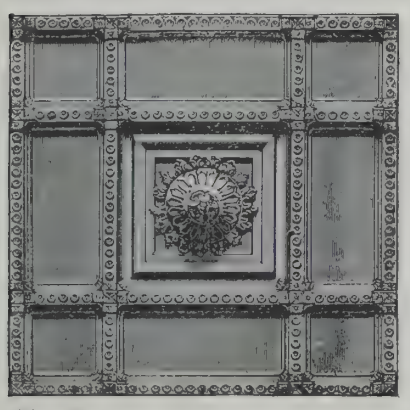
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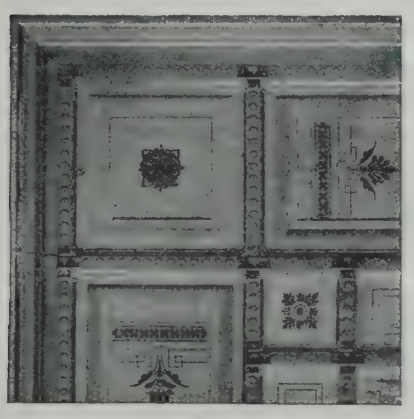
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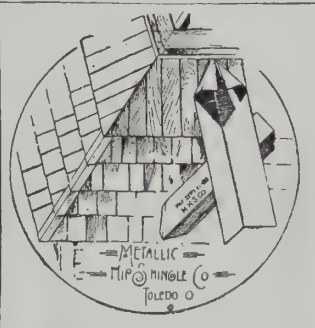
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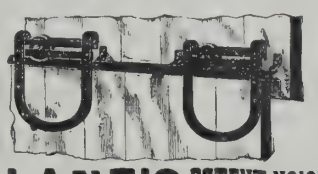
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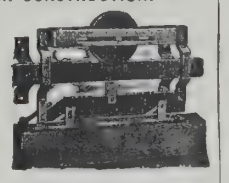
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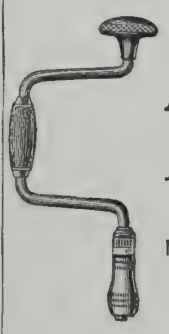
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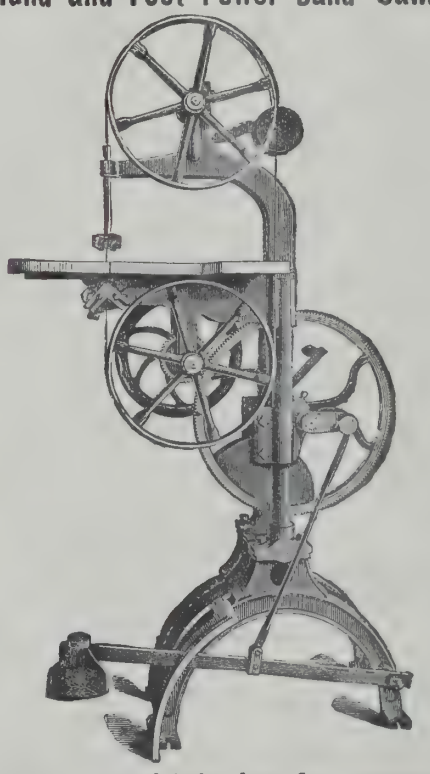


Table is 3 feet 6 inches from floor; measure 18 x 21 inches; is adjustable for cutting on a bevel. Guide for saw both above and below table. Distance from table to guide when raised its full height, 5 inches; 16 inches between saw and frame. All gears cut from solid iron. Shafts are made of steel. Saw pulleys covered with rubber. Upper saw pulley has adjustment to bring it into line with lower saw pulley. Weight of machine, 260 lbs. Machines on trial.

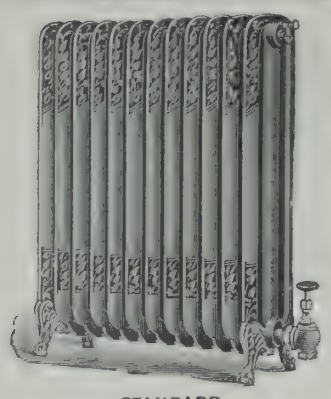
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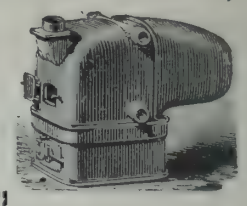


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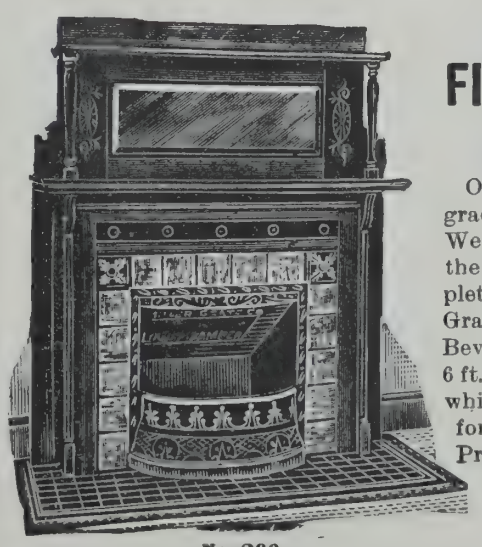


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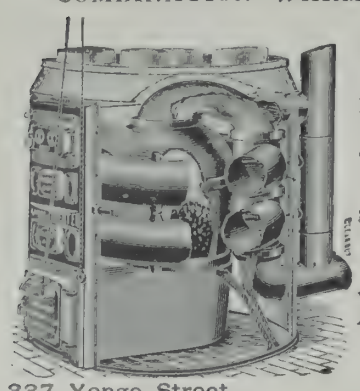
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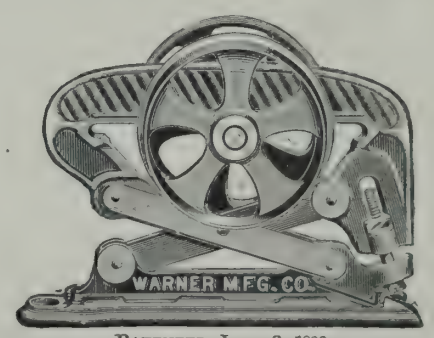
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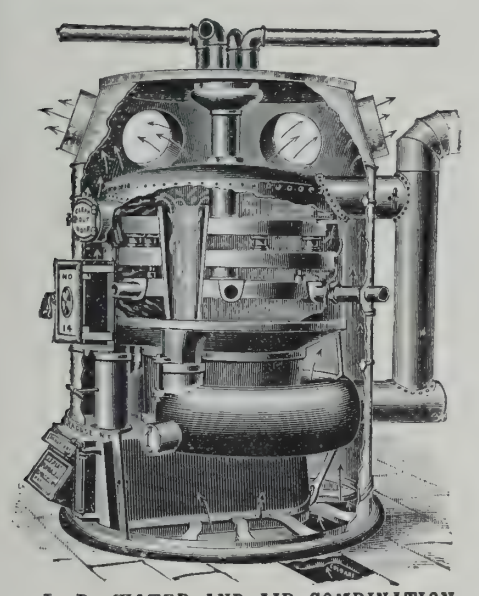


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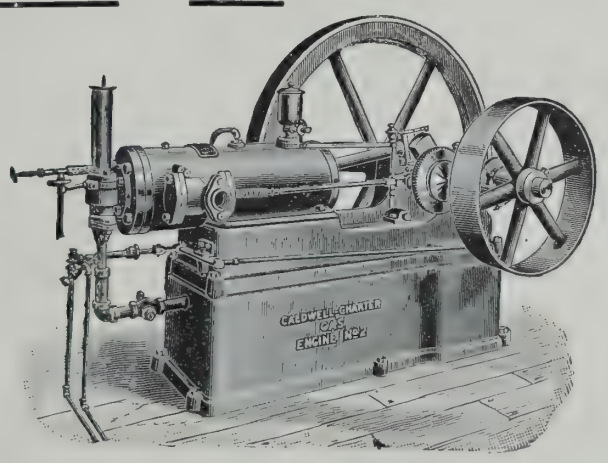
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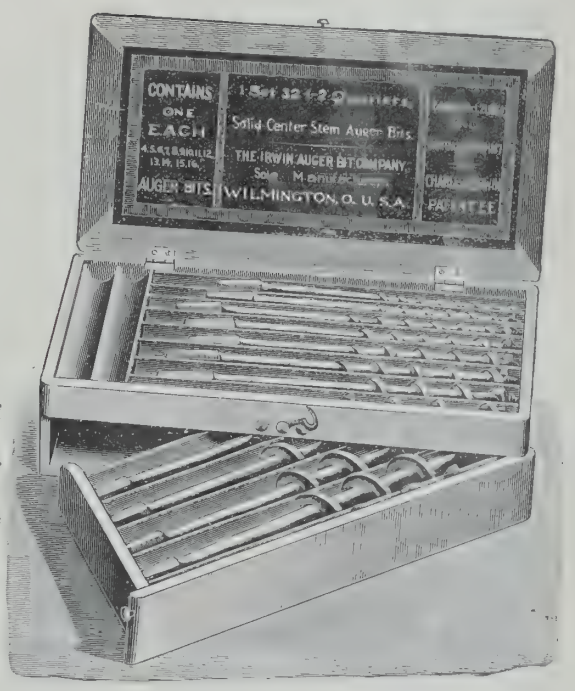
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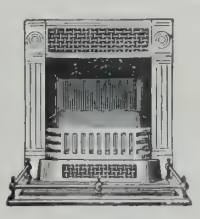
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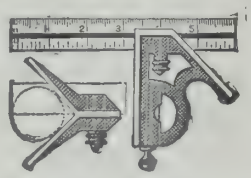
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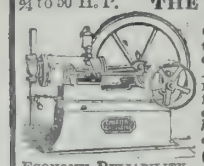
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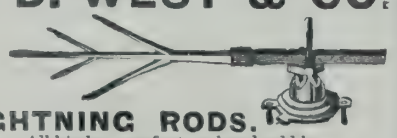
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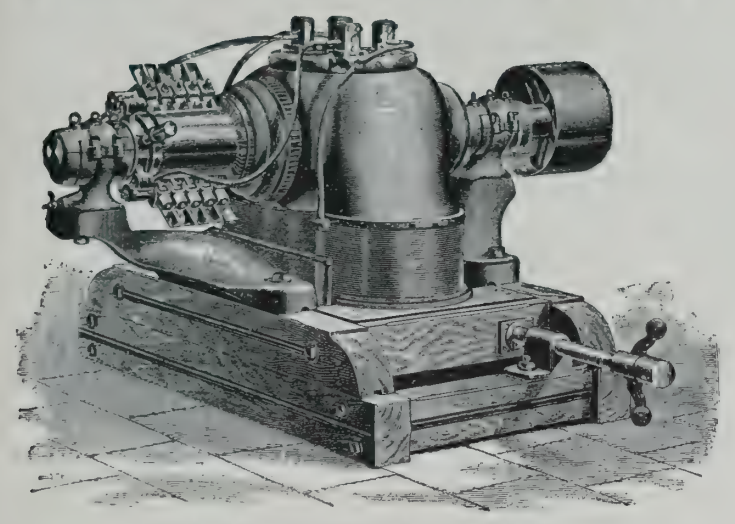
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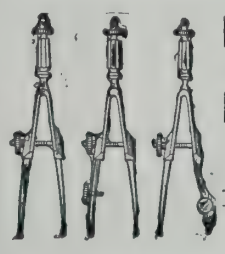
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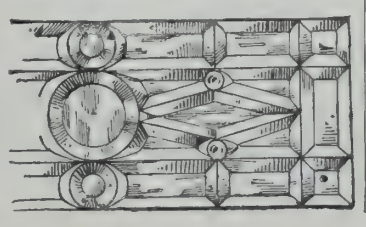
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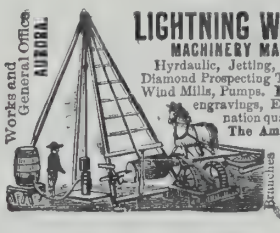
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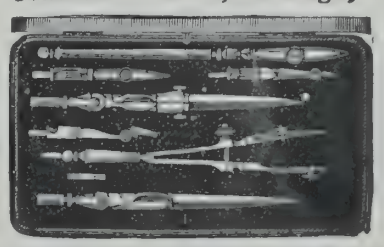
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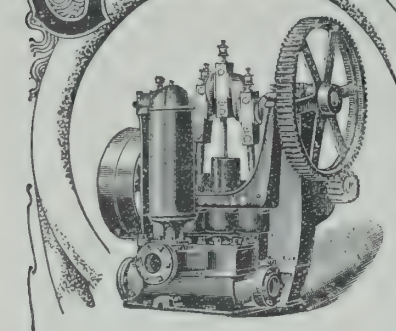
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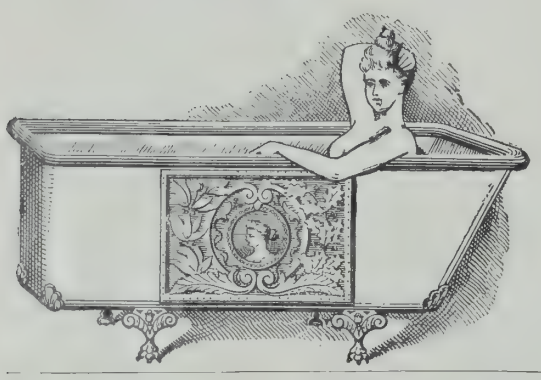
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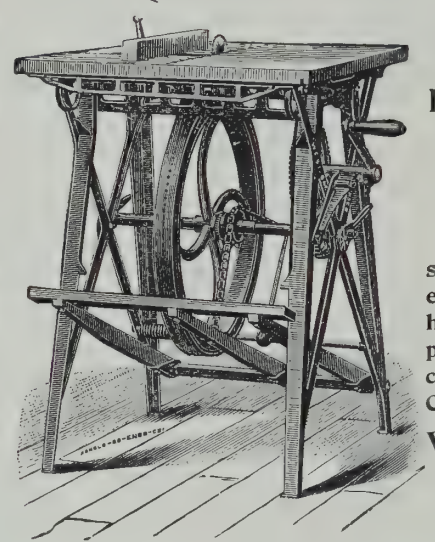
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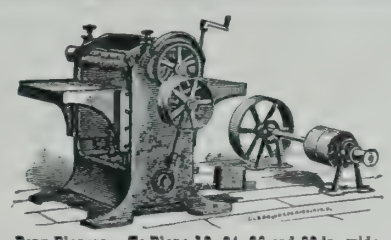
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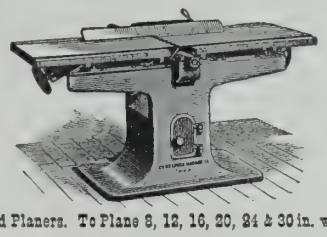
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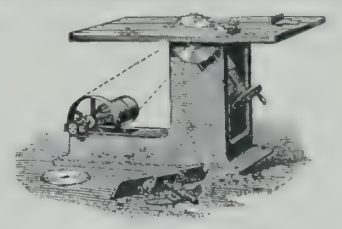


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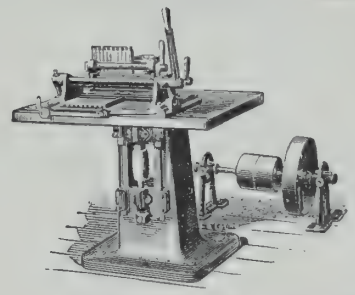
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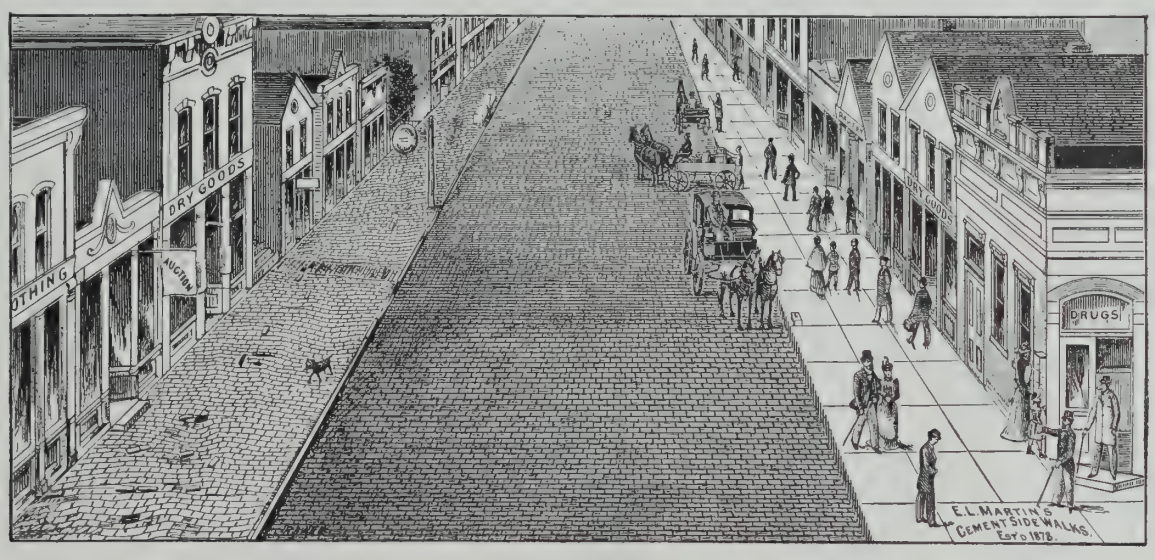
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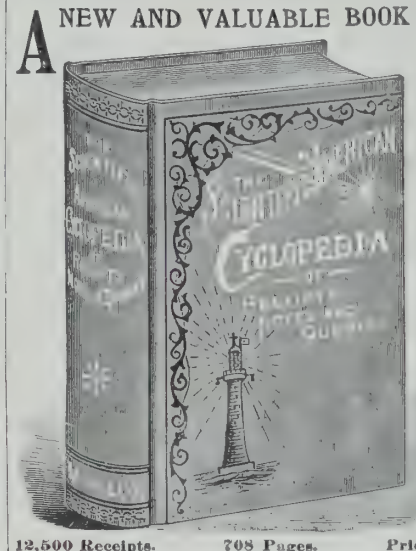
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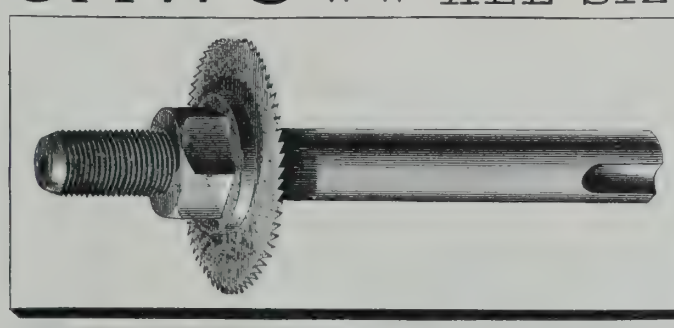
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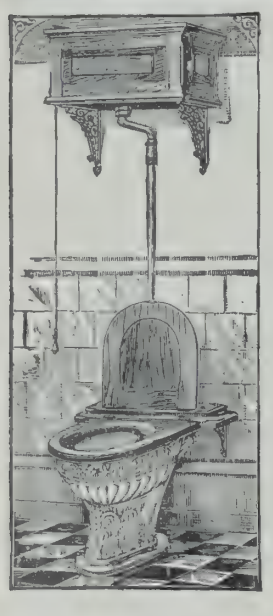
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TOCH BROS., Send for Catalogue and Circulars.
35 BOWERY, NEW YORK.
Established 1848. | ALSO MANUFACTURERS OF COLORS, PAINTS, VARNISHES, Etc.

(*Continued from page* iv.)

do not give details enough for the best advice. It is worth your while to have a survey made as to the whole grade and ascertain whether a detour could be made for a gravity flow. If the water in the river is good, a large ram with a fall of 4 or 5 feet would make an economical water supply. Steam is a constant expense. Perhaps windmills could be used. The Rose Polytechnic Institute, Terre Haute, Ind., is one of the best schools in mechanical and electric engineering in the West, also the Vanderbilt University, Nashville, Tenn.

(3) B. & T. ask: What will take off lampblack that is used in mortar and has got on the face of the brick? Our mason used muriatic acid and then put on linseed oil. What will clean it, if anything? A. Rub with a piece of pumice stone or sandpaper.

(4) L. A. L. writes: Last fall I dug a well for domestic use. I struck water at 26 feet, in a gravel bed, immediately below a stratum of blue clay. We have used the water all winter and always considered it good (though hard) until a week or so ago, when it developed a peculiar mineral taste, having a lot of reddish sediment in it. I inclose a sample of this latter, which I took from less than a gallon of the water. I would like to know what is the reason of it, and also if it is safe to use the water? A. The sample appears to be oxide of iron and clay. Probably it is harmless, but not pleasant to drink. We recommend putting a drive pipe in the bottom of the well and connecting directly with a pump to draw water from a deeper and possibly more satisfactory stratum.

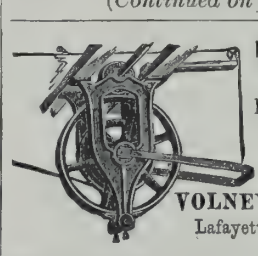
(5) M. J. B. asks the size of stack that should be put on dry kiln, size of which is 62 feet by 27 feet by 7 feet, and containing 5,000 feet of steam pipe. We would like to remove the air out of the room about every ten minutes. A. Assuming the steam pipes are on or near the floor and the lumber piled above the pipes, the ventilation in so large a floor space should be divided so as to make an even flow of the air throughout the room. For this purpose at least six uptakes should be made through the ceiling, 18 inches square, equally dividing the areas of the ceiling. These uptakes need be no more than 8 or 10 feet high, with hoods to keep out rain, and dampers, so that they may be closed when steam is first turned on.

(6) J. H. R. writes: I wish to lay out my yard in walks. I do not care for brick, but a preparation to put on the ground. Now is there any cement, or preparation similar to cement, that will stand freezing? And if there is, can you give me cost per square foot or yard? A. Probably hydraulic cement mixed with sand, 1 of cement to 2 of sand, makes as good walks as anything that you can handle. The cement is about $1.25 per barrel, and 1 barrel should make about 4 square yards of walk 1 inch to 1½ inches thick. Mix dry, and wet and spread quickly. Smooth with a trowel.

(7) L. P. writes: I have built my house from plans made by you, and am more than pleased with it. Since then a number of lightning-rod agents have been around to try and sell me their rods. Would it not be just as safe to put up ½ or ¾-inch gaspipe, with a good point and a large plate at the bottom to scatter the current? A. Gaspipe is often used for lightning rods, but iron is not as good; copper is preferable. Probably the best form of lightning rod is a copper strip nailed directly to a building and connected with a good earth plate.

(8) S. B. writes: We have two large iron colums, one on each side of boilers, in basement, both essential supports to a six-story building. They get very hot. Will you please advise us if expansion

(*Continued on page* viii.)



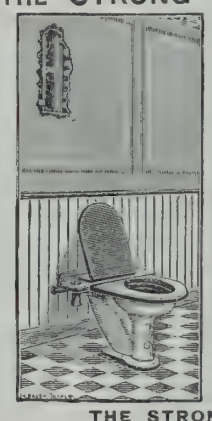
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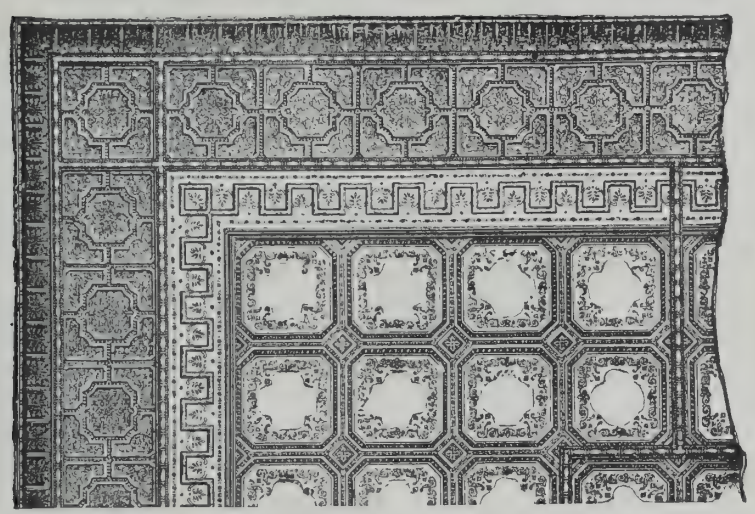
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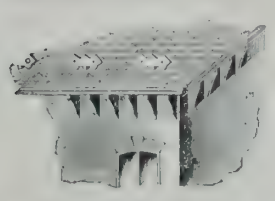
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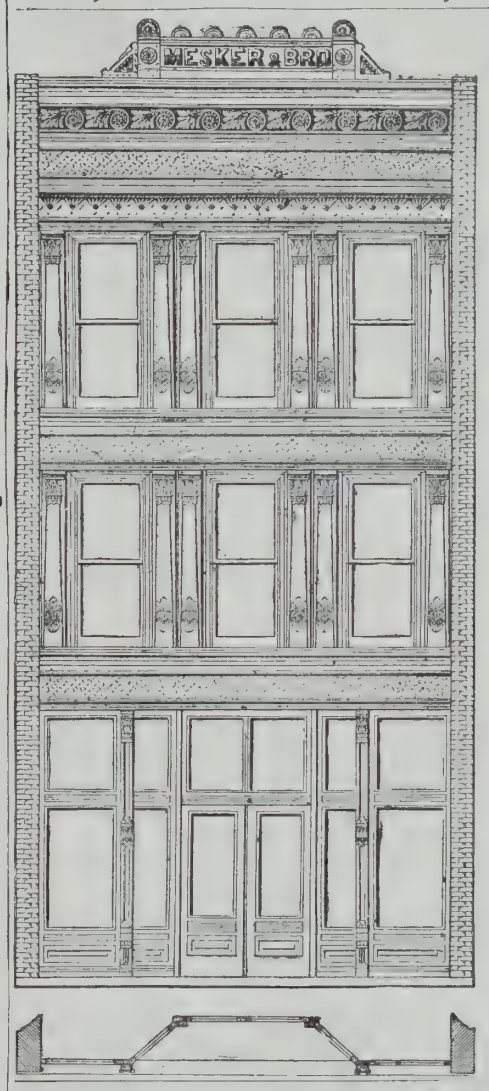
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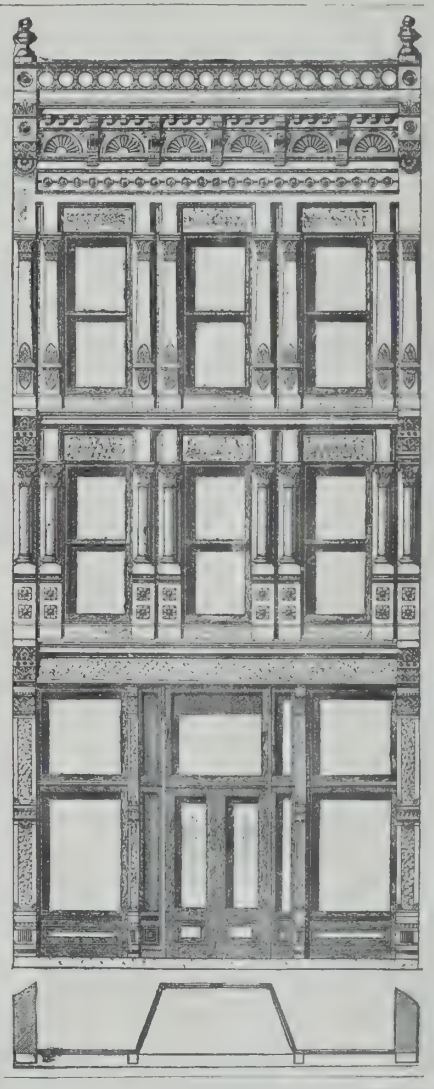
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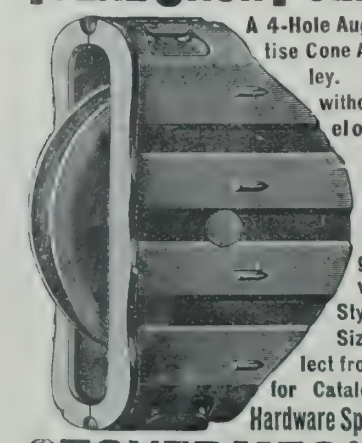
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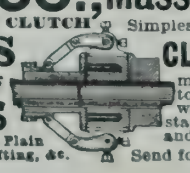
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(*Continued from page* vi.)

and contraction of same is any indication of danger? A. There is no danger from the influence of the heat, if the columns are outside the brickwork of the boiler setting.

(9) F. B. says: I want a receipt for a paint to apply to a copper-lined bath tub from which the tin has been worn in patches. I would prefer some white color. A. Use ordinary white paint.

(10) J. R. A. B. says: I am building a brick storage room addition to a small ice-making plant. The walls are 13 inches thick, floor will be concreted and will have good drainage. What will be the best way to line the building inside, and ventilation of same? There is a tight wood floor above storage-room; the walls are solid and have only door openings. We wish to keep the outside walls dry and free from moisture. A. For the storage of ice the concrete floor should have a pitch to a cesspool or a drain with a trap, and should have a rough floor laid scantling blocked clear from the concrete for drainage. The side walls should be furred off with 2x6-inch strips, edgewise from the wall, boarded up and filled with hay as the boarding is put on. If possible, the inside of the brick wall should have a good coat of coal tar put on hot to keep the walls dry. The beams overhead should be ceiled with matched boards, and packed with hay as the boards are put up. The doors should be double, and will supply sufficient ventilation by their use.

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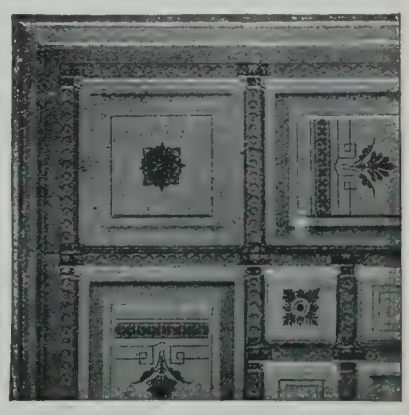
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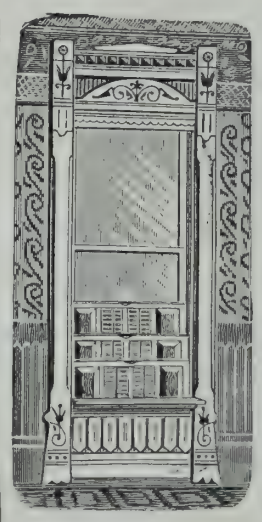
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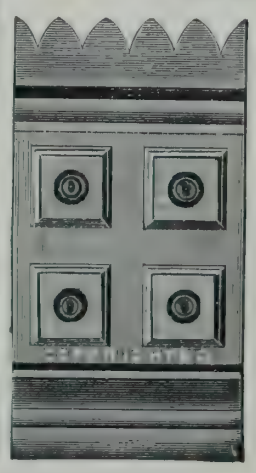
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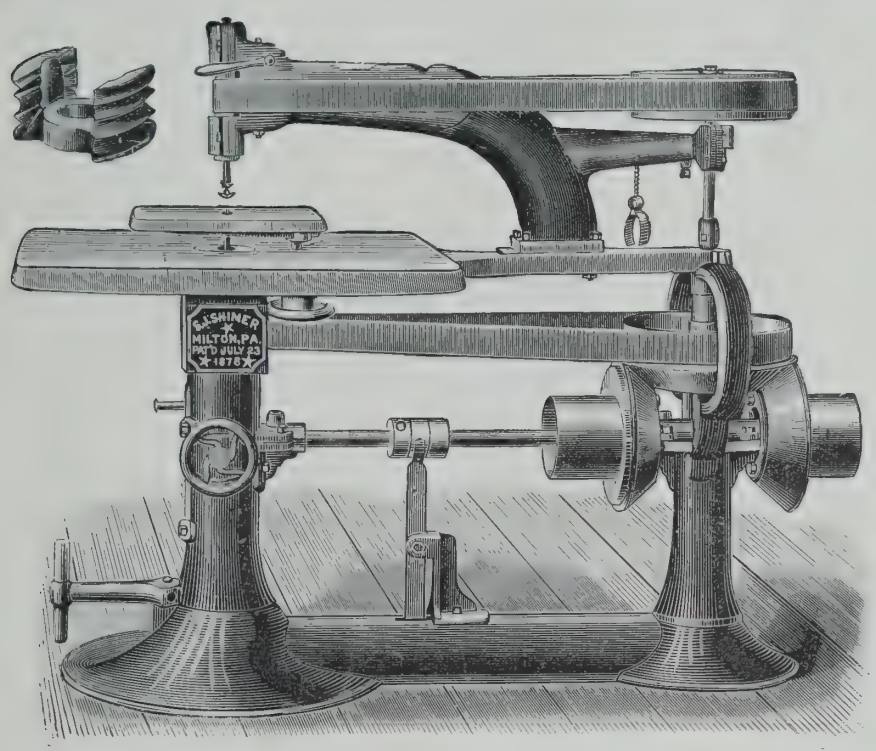
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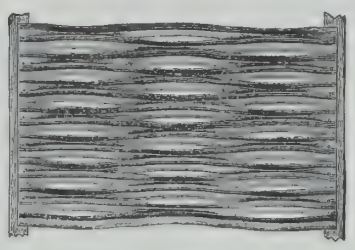
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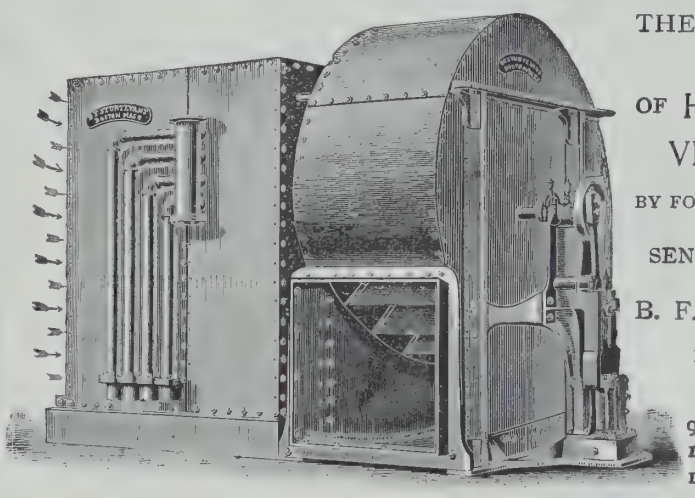
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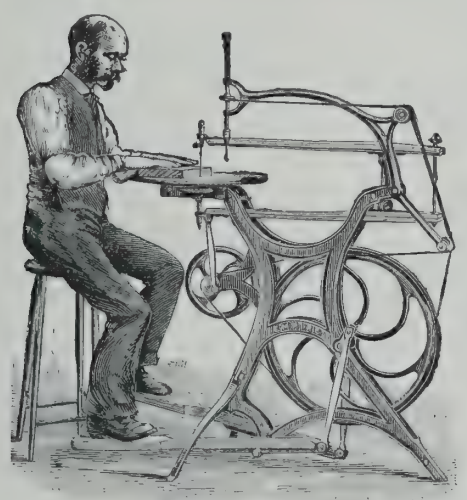
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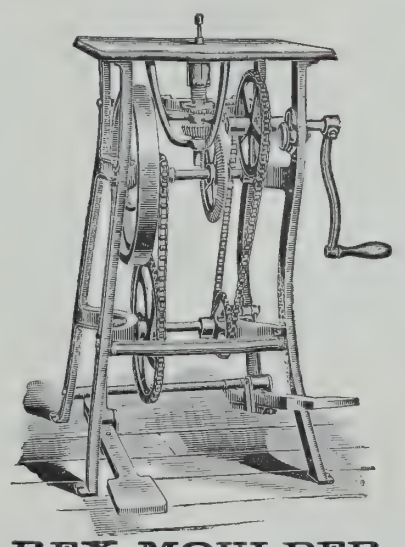
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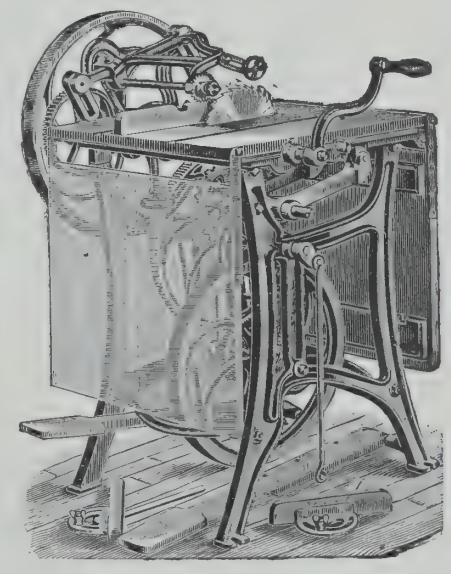
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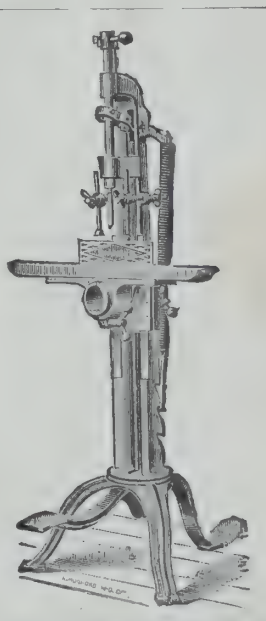
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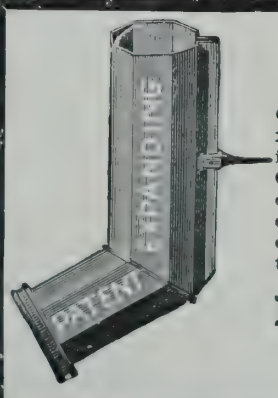


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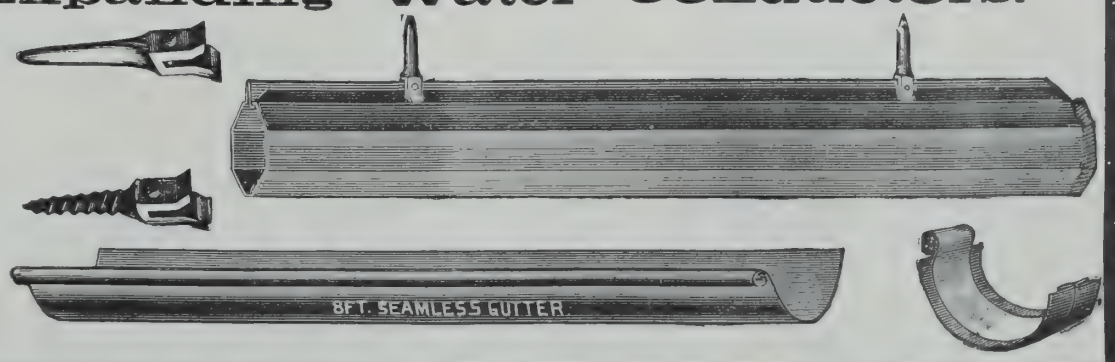
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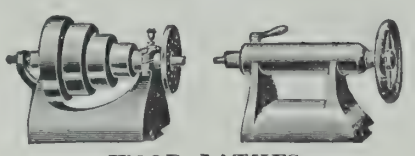
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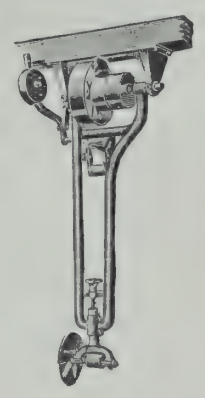
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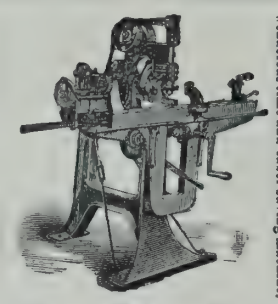
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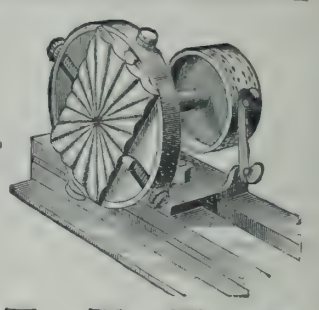
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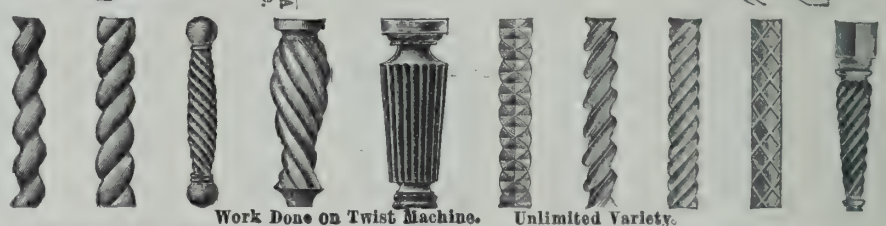
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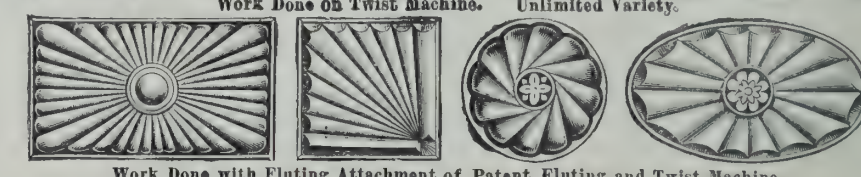
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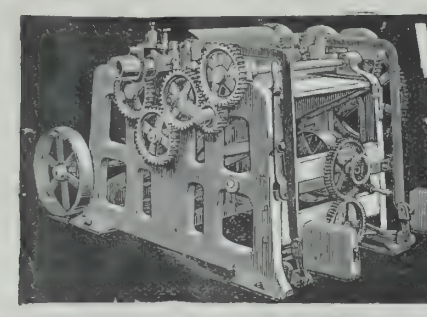
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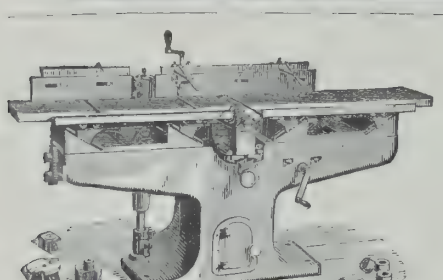
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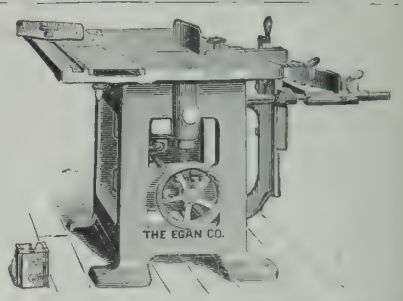
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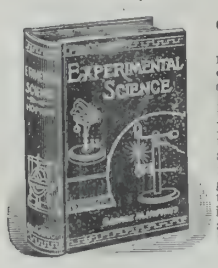
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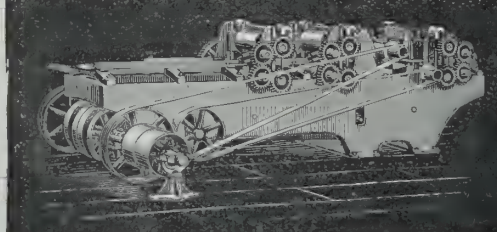
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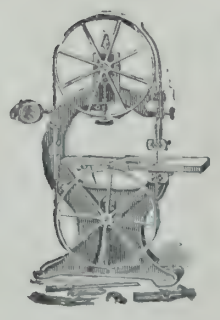
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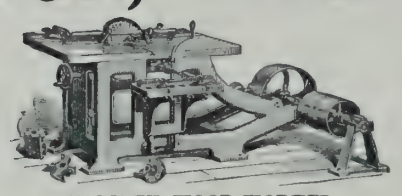
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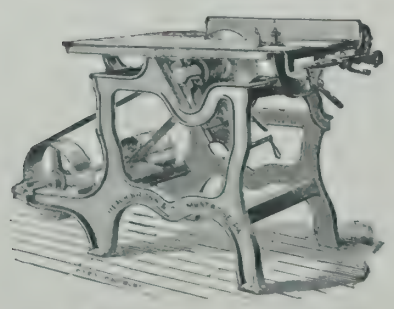
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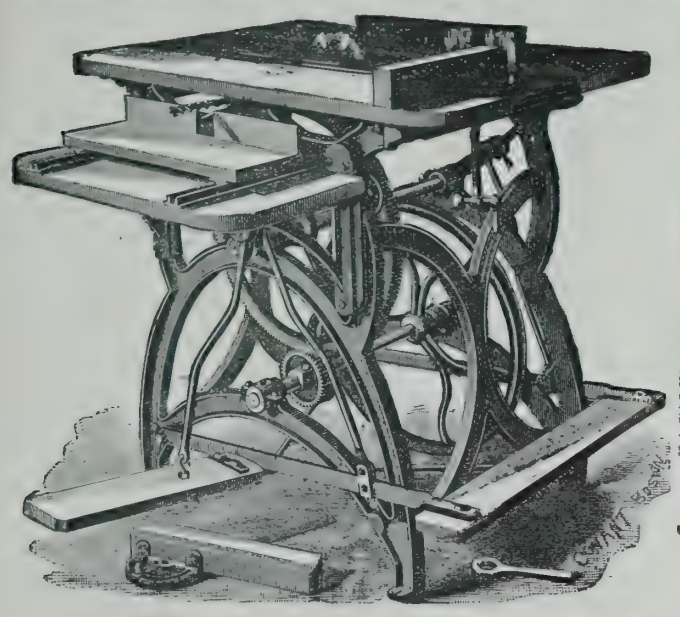
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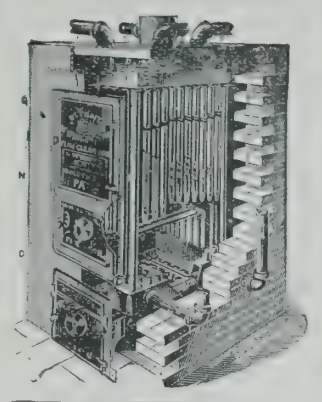


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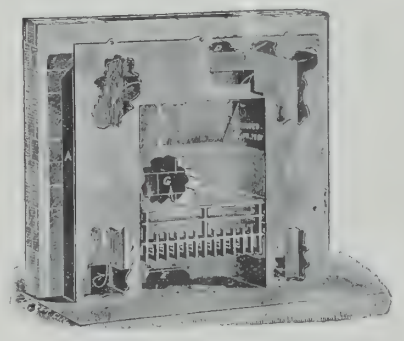


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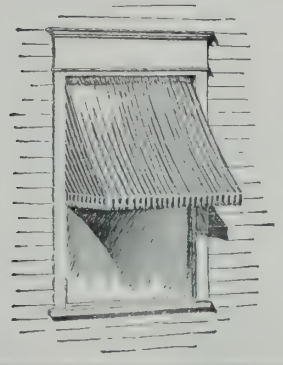
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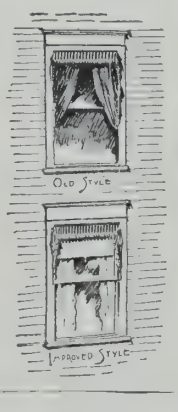


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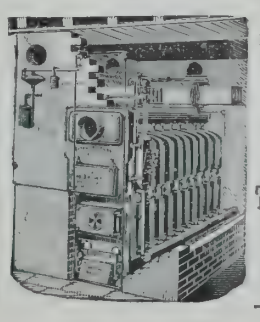
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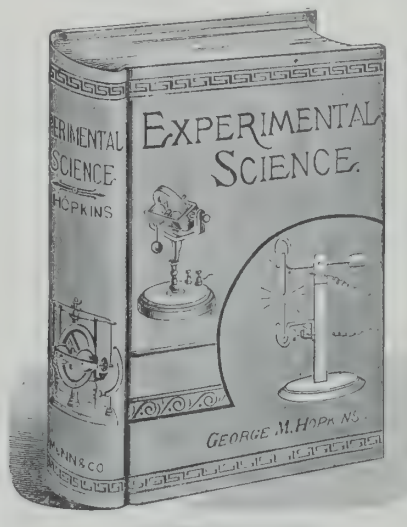
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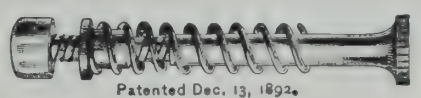
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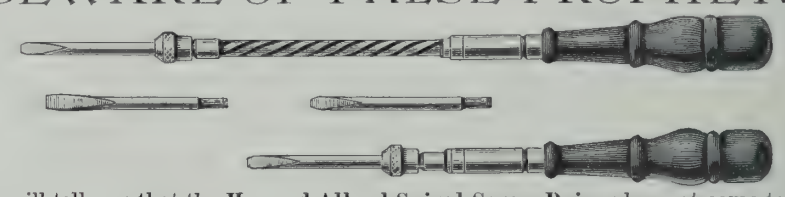
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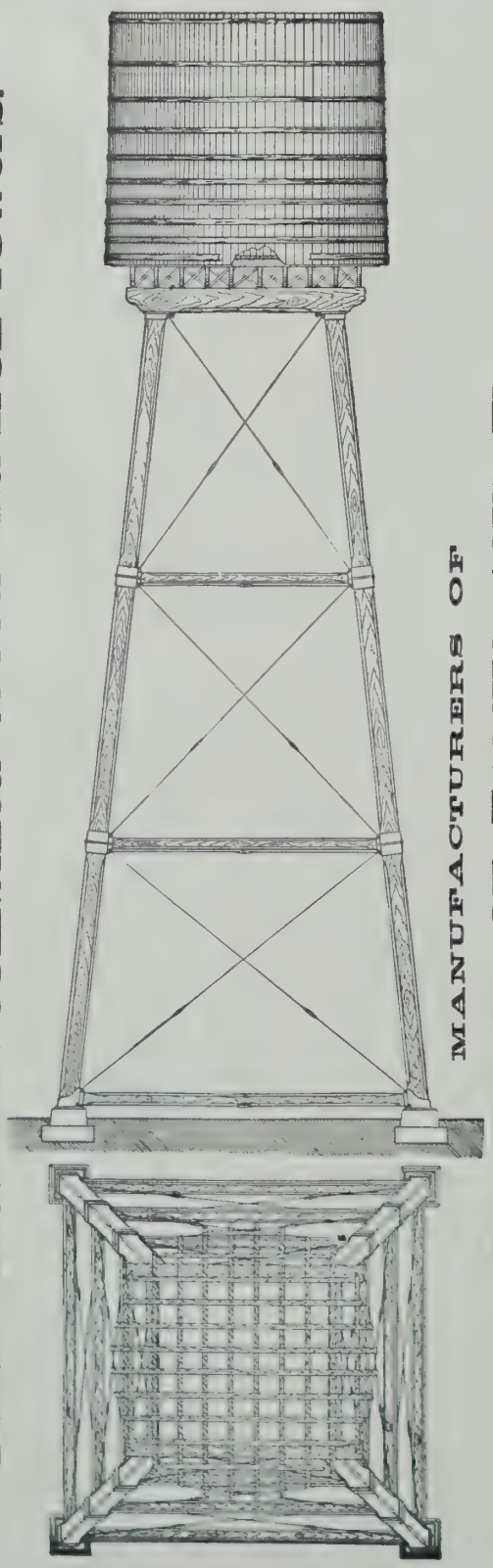
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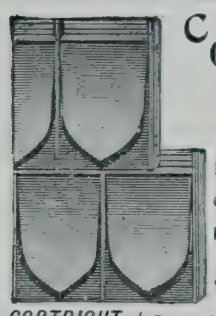
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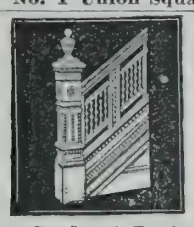
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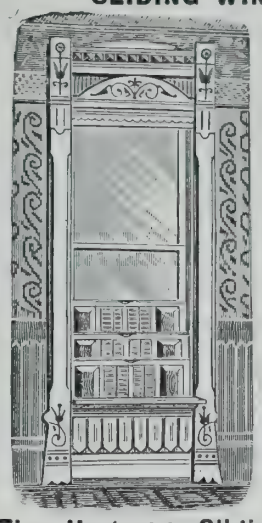
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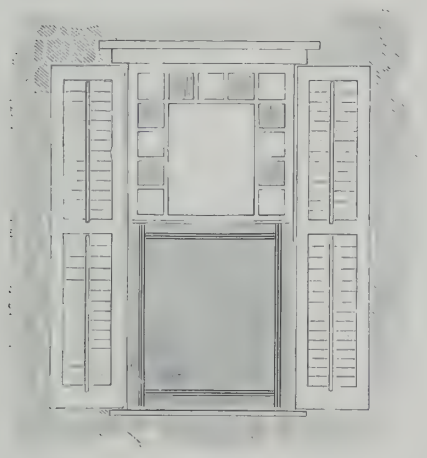
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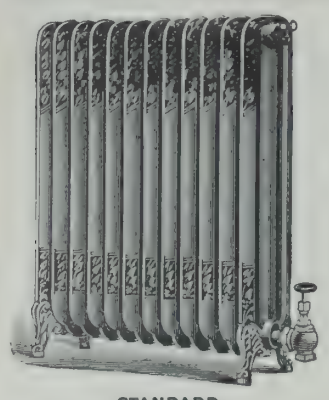
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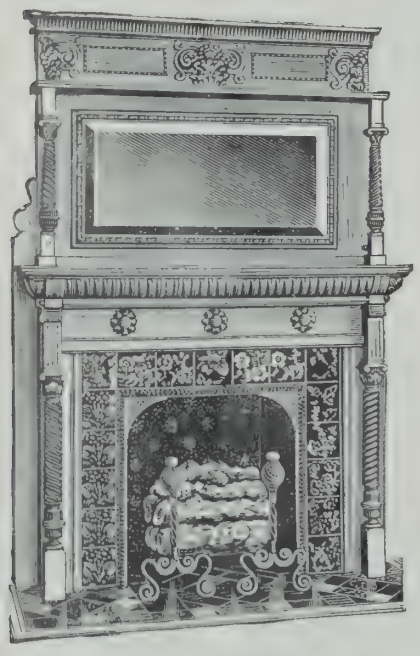
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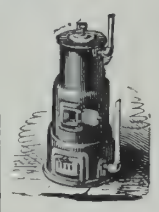
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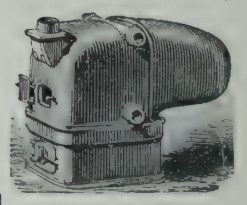


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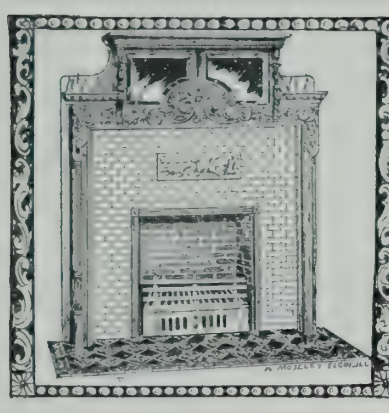
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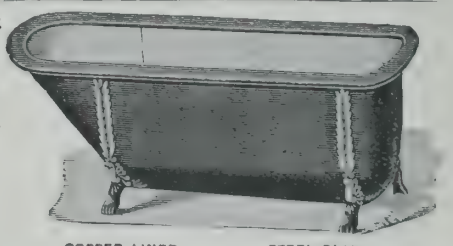
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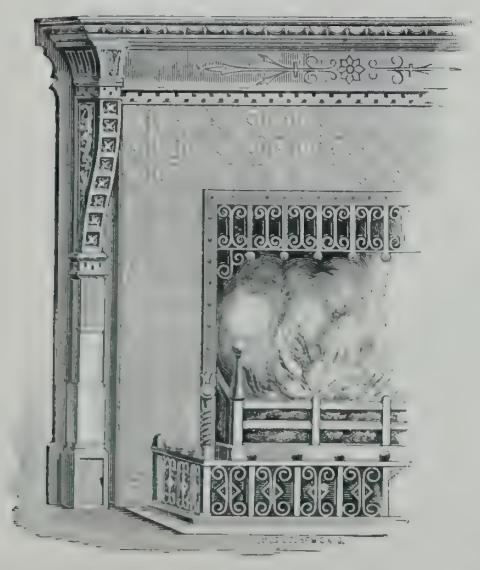
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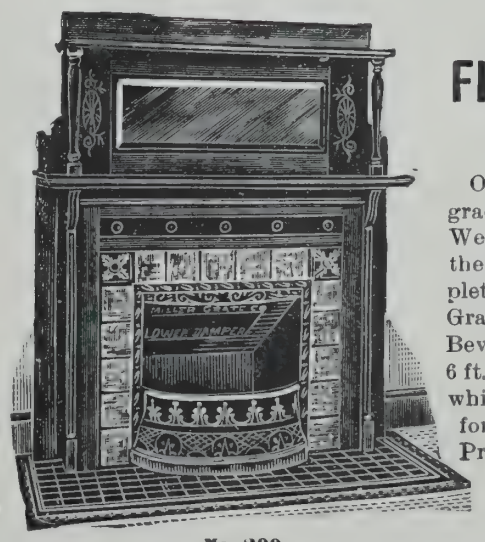
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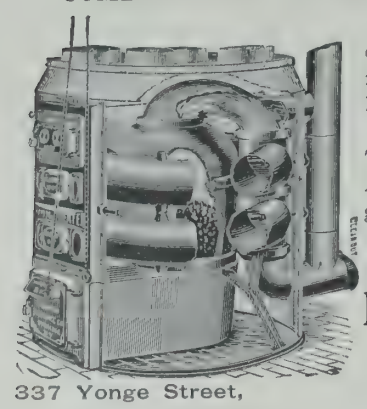
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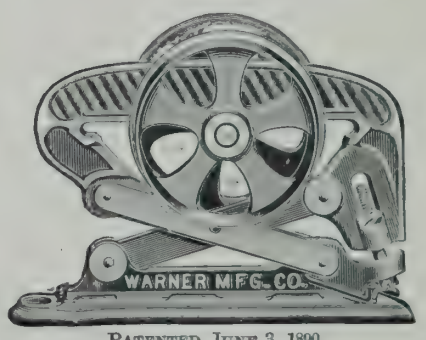
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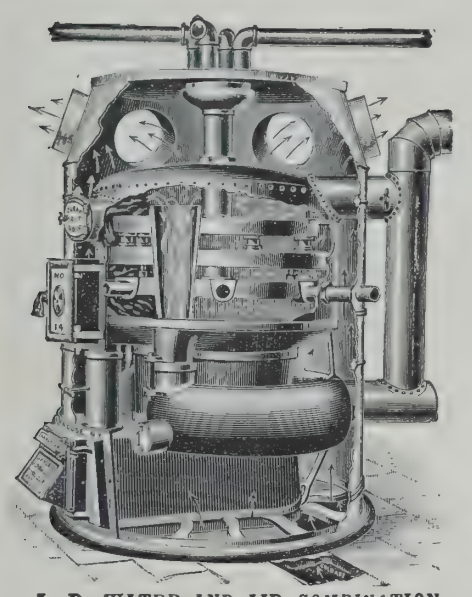


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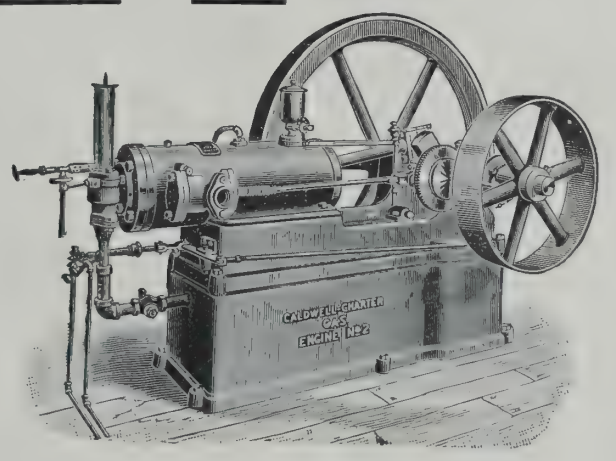
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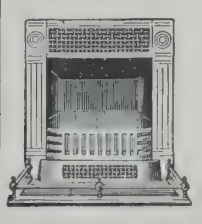
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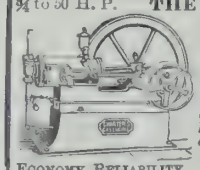
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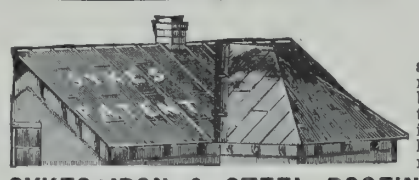


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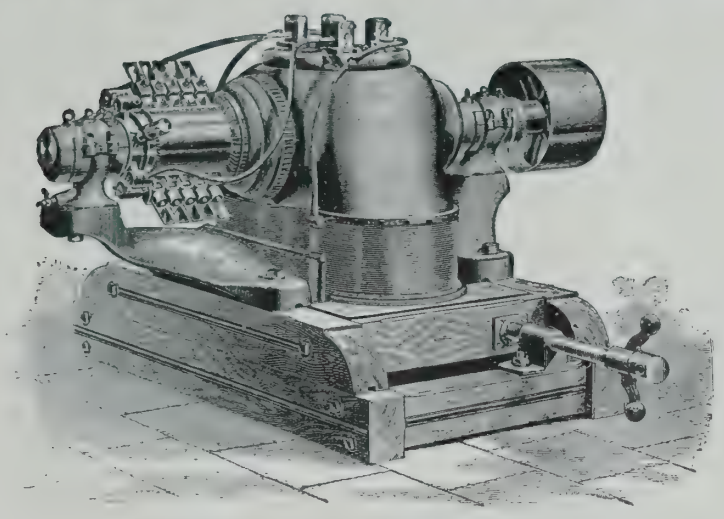
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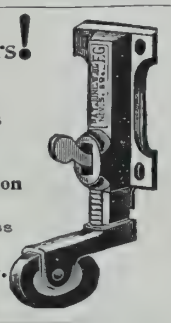
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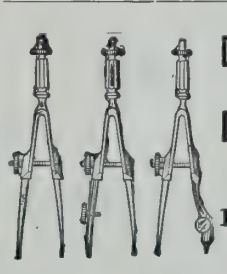
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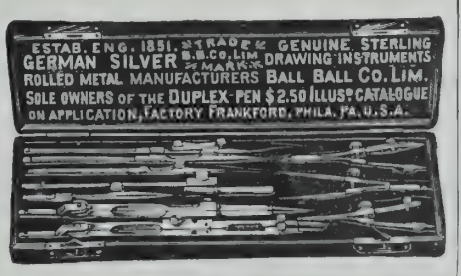
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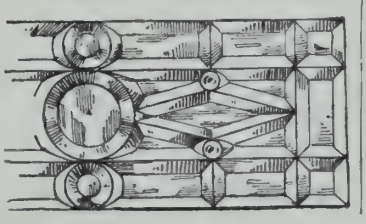
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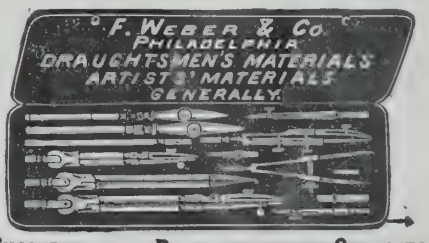
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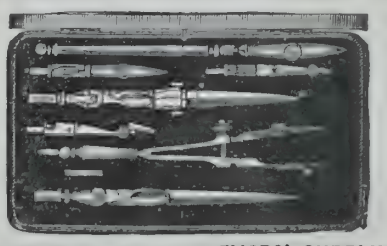
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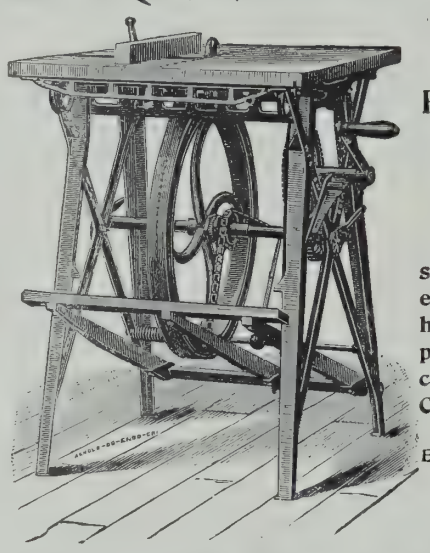
(4) F. O. J. says: There is a bad echo in the Baptist church here. The audience room is 38×50 feet inside, with a ceiling 21 feet from the floor. About 4 feet of the sides and 6 feet of the ceiling is taken up by a rounding corner, so that the ceiling proper is only 26×38. The pulpit is at one end of the room and slightly raised. Can this echo be destroyed by stringing wires near the ceiling? If so, kindly indicate the manner. Can wire fine enough to be practically invisible be used? A. The hanging of wires and wire netting closely to ceilings and walls is said to entirely prevent echo. Such arrangement cannot be made invisible, but may be so arranged with fine wire netting put up in panels with rosettes or moulding strips as to be ornamental.

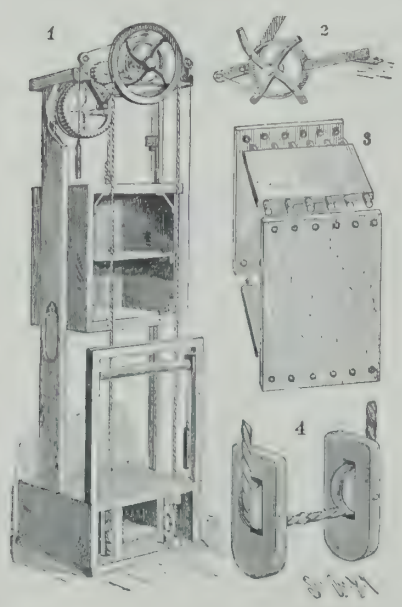
(5) H. J. S. asks: Which will take the most force, the pipe running up outside and running the water in at the top, or with the pipe screwed in the bottom of the tank? A. It requires the most power to pump the water over the top, by the difference in pressure between the level of the water in the tank and the inlet pipe added to the friction of the additional pipe to carry the water to the top. This amounts to 0·43 of a pound pressure for every foot of height between the level of the water in the cistern and the mouth of the pipe at the top. The friction of a few feet of pipe is small, but still a factor of lost power in a discussion.

(6) C. S. asks: In regard to deep wells, which water would be the most healthy, that out the black iron casing pipe or out of the galvanized casing? A. Water that is constantly flowing from a deep well pipe is equally healthy from both black and galvanized pipe. If the water is checked for a time without flow, the water from the black pipe may become charged with iron and will not be palatable although healthy, while water standing in the galvanized pipe becomes charged with zinc oxide, which is poisonous. If, then, the contents of the pipe is drawn off, the following water will be good.

(*Continued on page* vi.)

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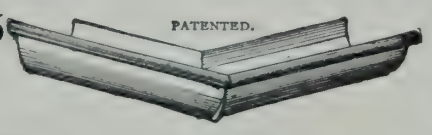
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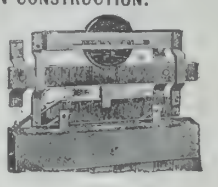
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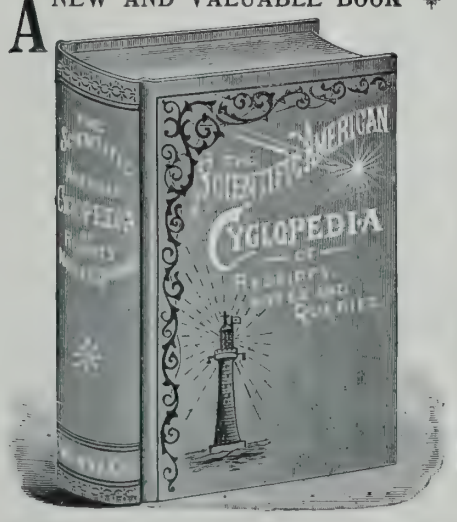
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(*Continued from page* iv.)

(7) J. H. R. writes: I have an electric bell from tank to house that rings when tank is full, the connection is made under water by a float pulling a brass wire against a copper wire above it. The copper wire will corrode in a few hours, so that a connection will not be made. Will you kindly help me out? A. We think you cannot expect good results from your electric circuits until you place the contacts outside of the tank. This you can readily do by connecting a rod with the float.

(8) C. H. B. asks: Will you kindly inform me of one of the best, cheapest, and most effective disinfectants? Please give me a prescription giving the different ingredients and quantity to use to make one gallon liquid. A. Probably the most effective disinfectant is chloride of lime mixed with water, about half a pound to a gallon of water. The dry chloride is also a most efficacious disinfectant when placed in shallow basins and exposed to infection air in confined places, as under sinks and water closets. It is exceedingly penetrating and will destroy or drive out vermin.

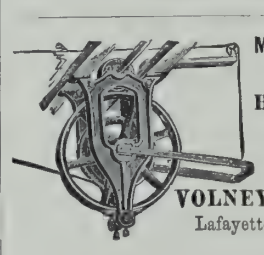
(9) A. B. C. asks how to obtain the smoothest finish with Portland cement. How will I proceed to put half-round grooves, three-sixteenths inch wide and one sixteenth inch deep, on this surface? Shall I let the cement harden, or proceed while still soft? This is to be used for a revolving sliming table in a concentrator. A. Use a hard polished steel trowel on the surface just before it sets, and for polished grooves a polished steel plate with ribs at one edge, also of polished steel, of the form of the grooves.

(10) M. P. asks: Please let me know if I can burn bricks thoroughly in six days. Also let me know if I can burn bricks thoroughly by the sides of the walls, and is there a book referring to the subject. Also do I need a solid wall or only serving to burn the brick hard, and do you cover the top of your kiln with clay? A. Bricks can be burned in six days in small kilns and strong firing. The chances of making good brick are not insured by quick firing and short time, as the moisture should be discharged slowly in order to keep the brick in good shape. The brick next the outer wall are the last to heat, and make soft brick, so that a good outside wall and serving pays in making good brick at the outside. The top is gradually covered as the burning is finished. See an excellent work on "Brick Making and Burning," by Creary, $2.50 mailed.

(11) F. M. M. writes: In our gas field we have rock pressure of gas 135 lb. Our line pressure is about 125 lb. The question in dispute is this: We have a four inch pipe running from part of our field, say three miles, into the six inch pipe. Parties here claim by placing another three inch pipe alongside the four inch, we would gain pressure by it on the six inch line. We have now, understand, twenty-two miles of six inch, and three miles of four inch. I claim the pressure would be the same, that is, it would equalize on the six, and pressure be the same; but by placing a pump on said line to force from the end of six inch line to city would be far better, and use suction on the four inch line. A. The difference in pressure between the four inch pipe and the six inch pipe is no doubt due to friction. Any additional supply that you can make to the six inch pipe by an additional pipe will increase the flow and tend to equalize the pressure or raise the pressure in the six inch main. A pump will also overcome the difficulty, but, in general, is expensive for gas transmission.

(12) B. M. W. asks: Can you give me any information regarding a paint that could be used on iron pipes and vessels that are heated from the

(*Continued on page* viii.)



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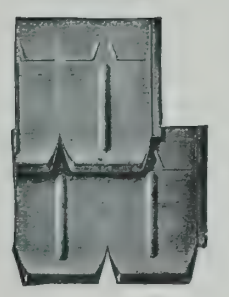
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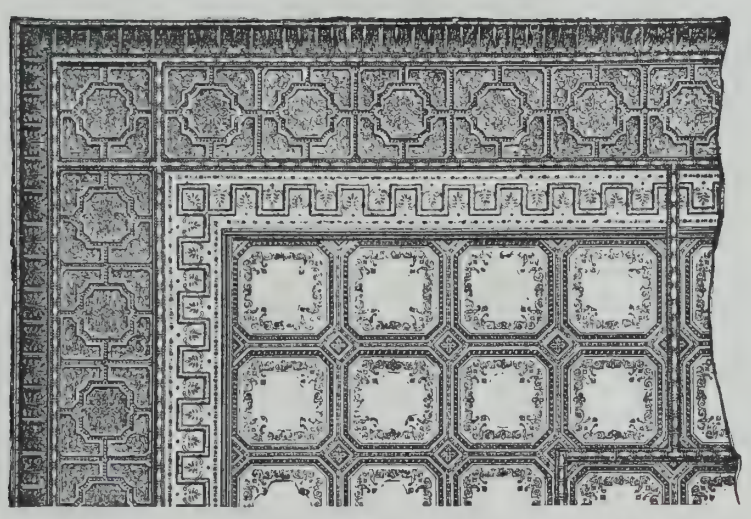
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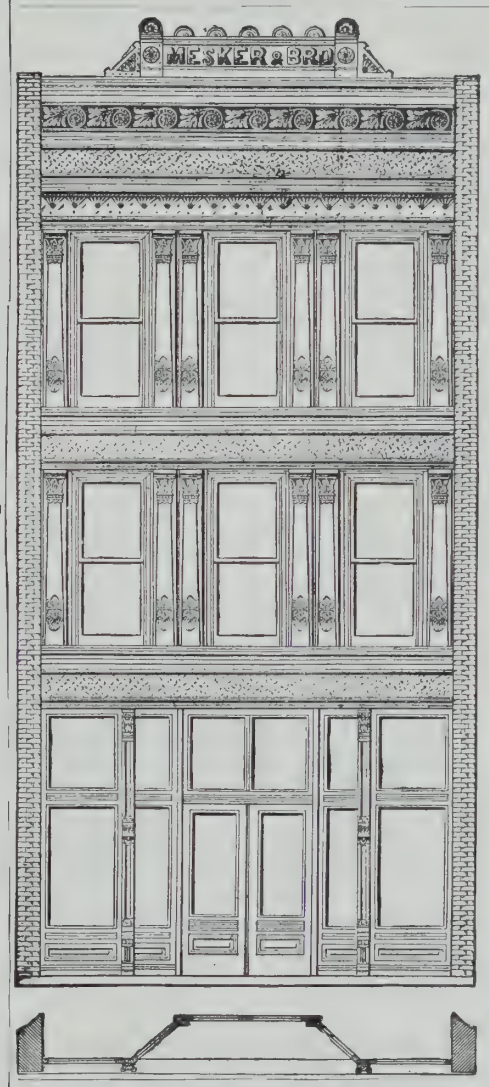
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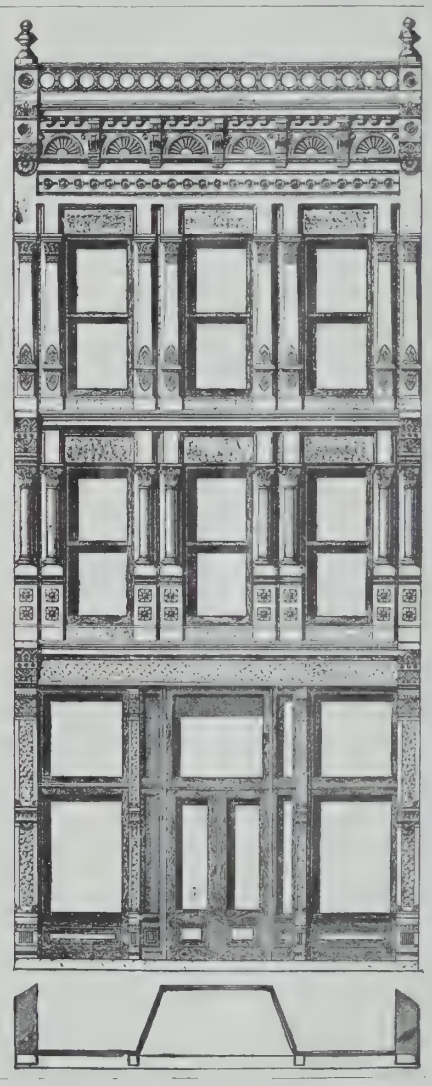


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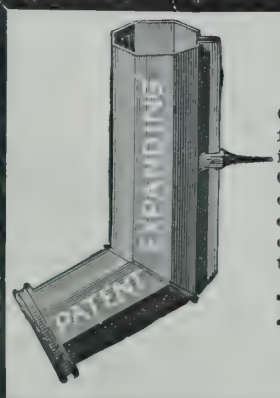
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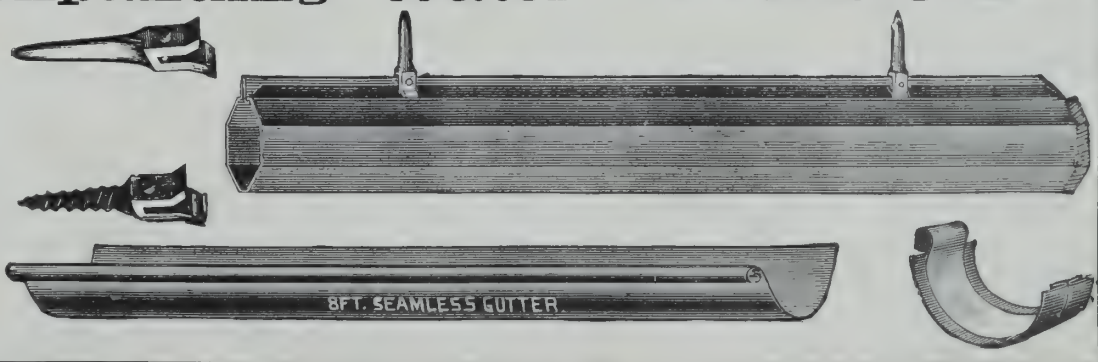
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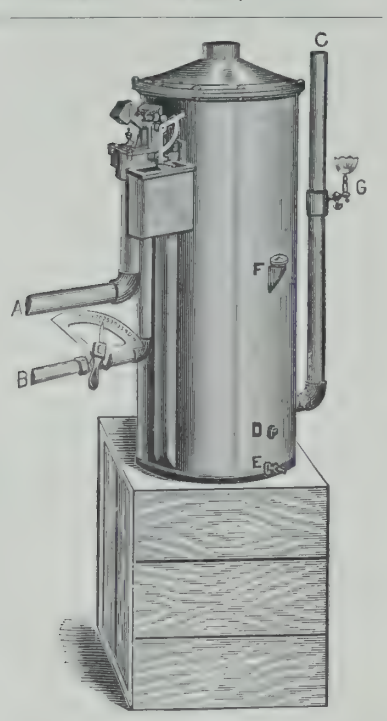
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(*Continued from page* vi.)

inside by steam, the temperature on said vessels not to go over 300° Fah.? All the paints I have tried so far burn off in from 2 to 4 hours. Also a receipt for mending pinholes in rubber air pillows. A. Steam pipes for high pressure steam are usually painted with coal tar or liquid asphalt. Red oxide of iron paint (dry), mixed with boiled linseed oil only, is much used on steam pipes. Use rubber cement for mending pinholes in rubber pillows; push the cement through the hole with a small stick while the pillow is partly filled with air, and allow it to thoroughly dry before using.

(13) W. B. writes: If the cables of the Brooklyn Bridge were to expand enough to allow the centre of the bridge to fall on a level with both ends, would the roadway sustain a part of its own weight from the sides, before reaching a level? A. The girders and stay rods would probably support themselves if the cables were removed. It is possible they would also hold the cables and whole bridge system besides.

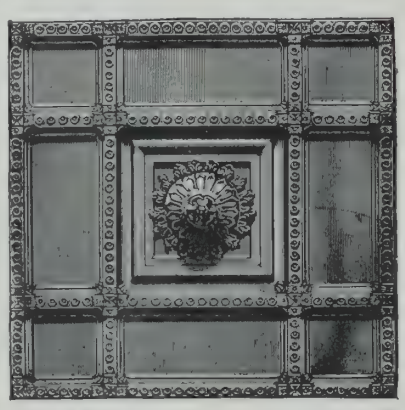
(14) G. E. K. asks (1) if there is any danger in drinking water filtered through common coke. A. No, provided the charcoal is renewed from time to time. 2. Do you know of any other substance better than charcoal, coke, or pumice stone for filtering water? A. We do not; metallic iron is sometimes used. 3. How can pumice stone be made into any desired shape? A. Pumice stone can be ground into powder, or it can be cut into shape, but it is not moulded, as far as we know.

(15) W. V. L. asks for any cheap substance or material that can be applied to the wires of a fence between the posts to which they are attached, that would effectually prevent the lightning from passing over it, from post to post. There is general complaint in that vicinity (Iowa) on account of the accidents resulting from this source, and some are discarding the wire on that account. A. We would suggest that you provide your wire fence with efficient ground connections at intervals. Nothing can be applied to the wire which will prevent the lightning from passing over it.

(16) A. S. writes: Can you tell me the secret of plastering a house so that the walls will not show cracks? I am just about to plaster my new residence, and upon inquiry I find some houses have been allowed to stand for months, and yet the cracks occur after plastering. Timbers guaranteed seasoned and no perceptible settling in walls, and the same thing occurs. So that I am inclined to believe that it is perhaps in the mixture and application of the mortar or plastering. A. Cracks sometimes occur in walls that have had the best of care. Apart from allowing time for the woodwork to season, the

(*Continued on page* xv.)

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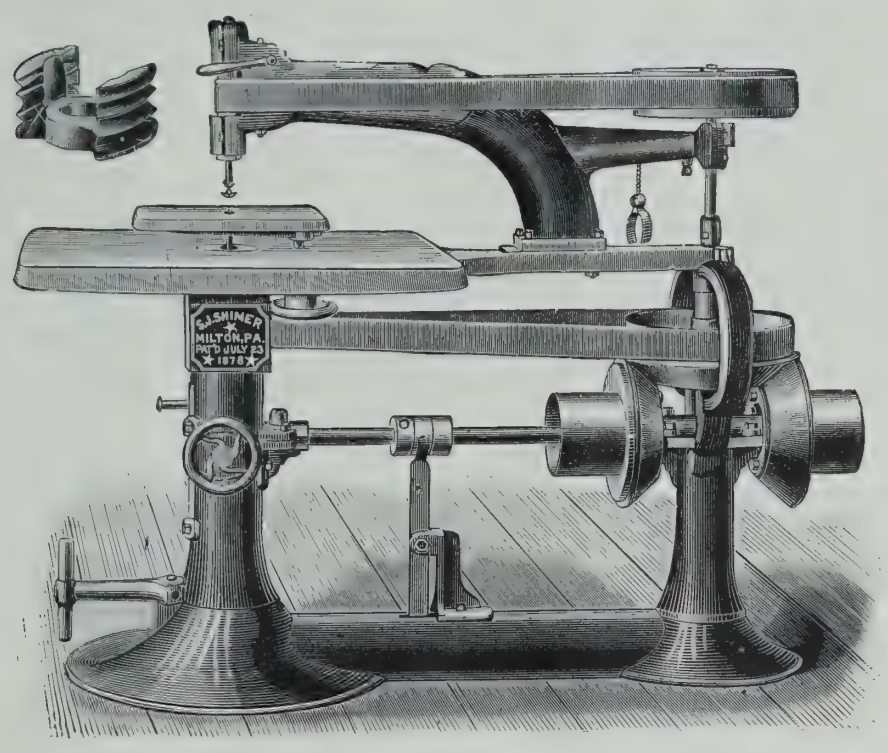
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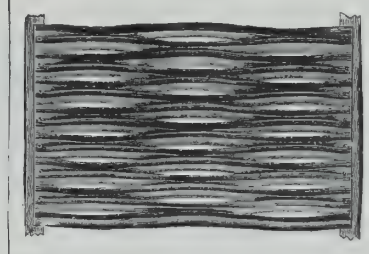
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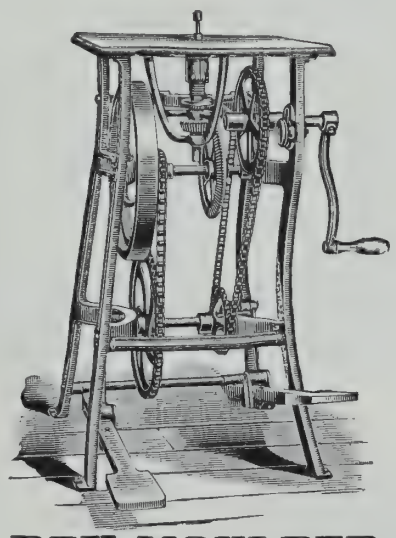


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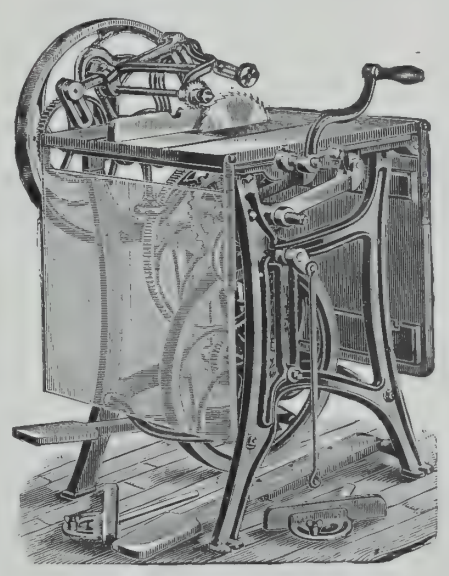
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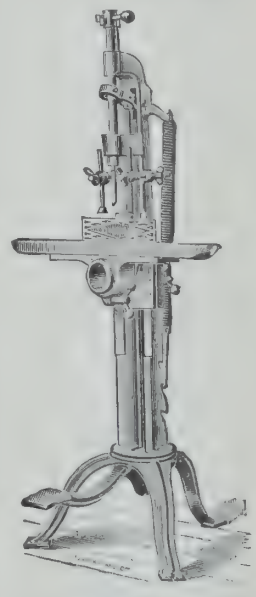


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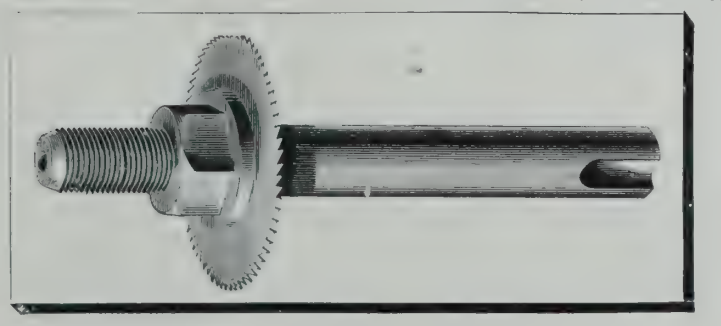
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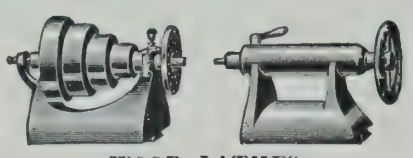
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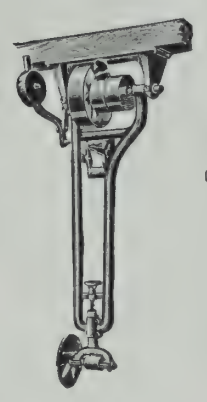
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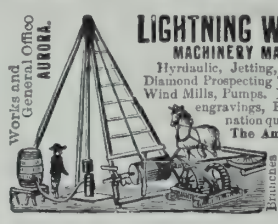
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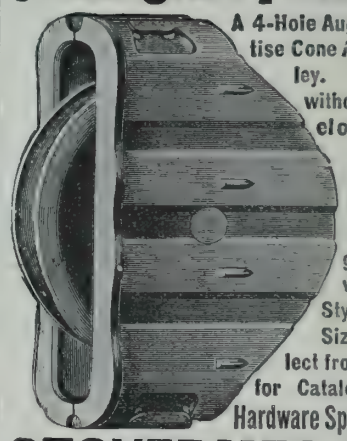
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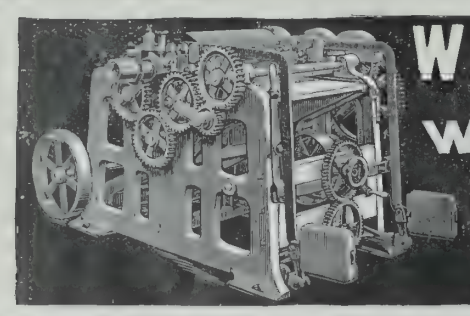
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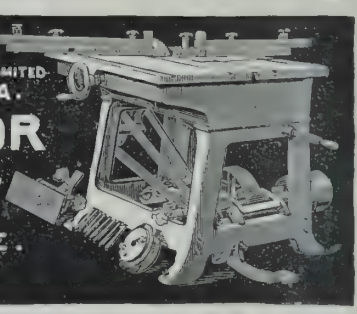
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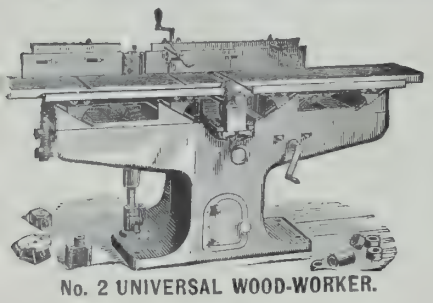
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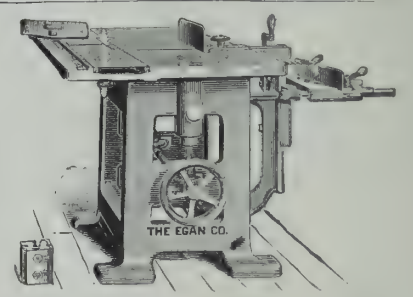
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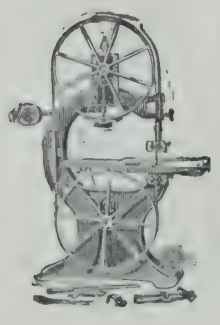
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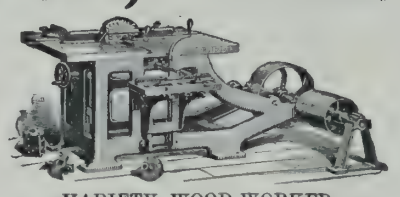
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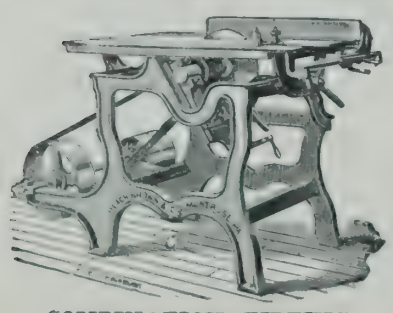
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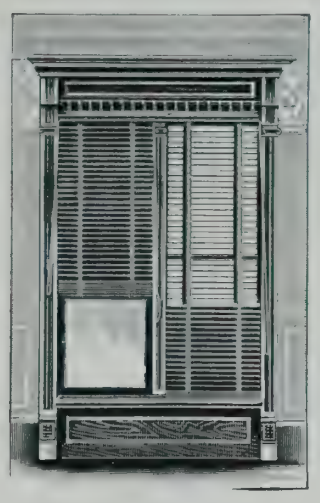
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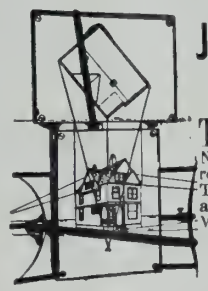


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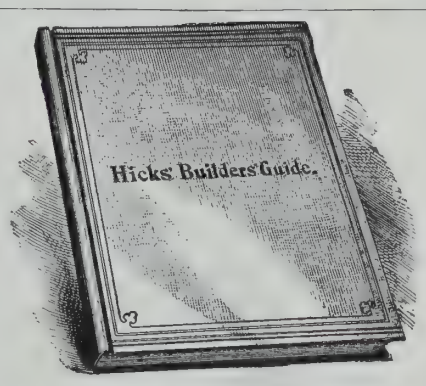
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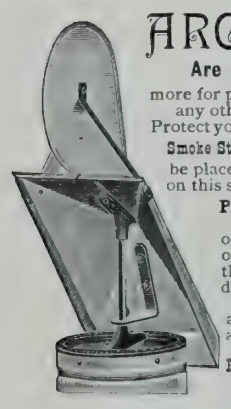
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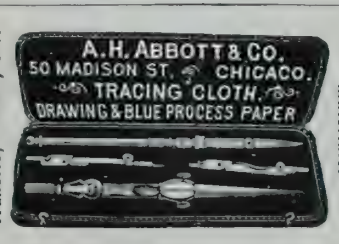
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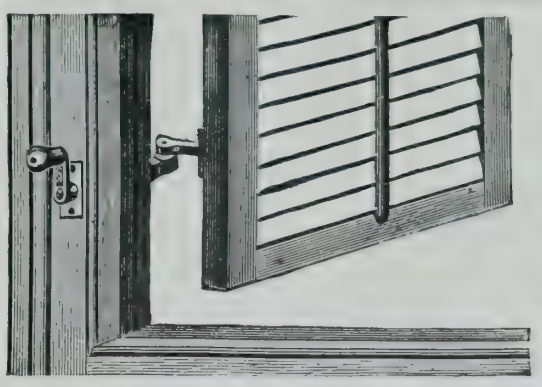
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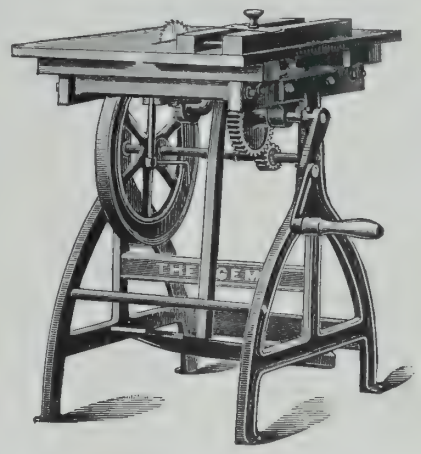
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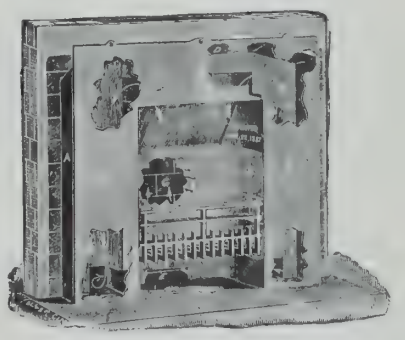
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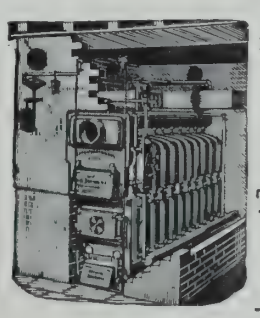


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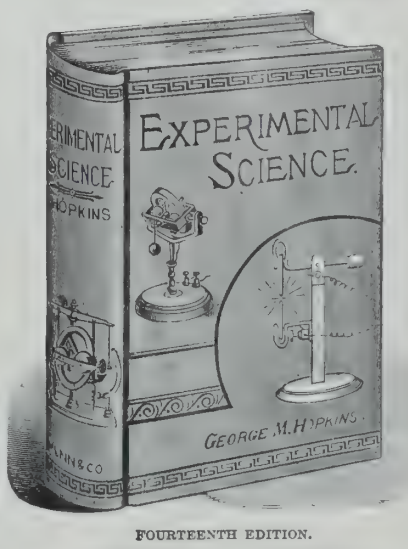
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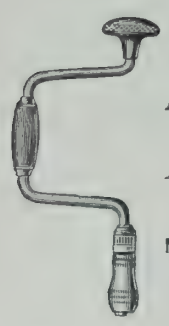
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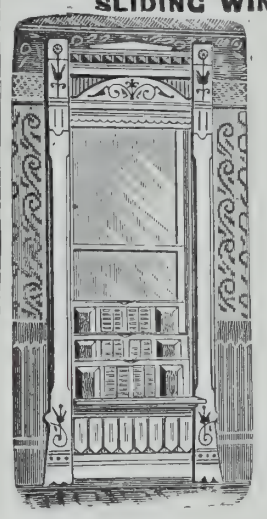
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(*Continued from page* viii.)

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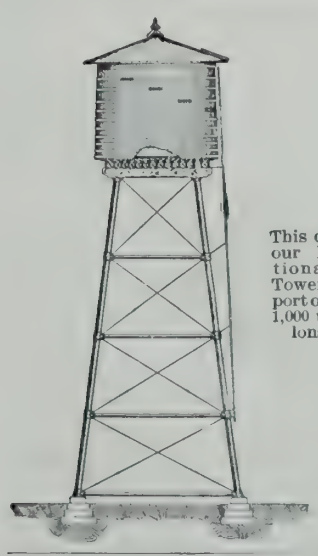
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(22). A. C. L. asks (1) how to remove machine oil and gasoline from the floor and siding of a frame building which some tenants have so completely saturated as to increase the fire risk and injure the appearance. A. It will not be possible to remove the oil, but the appearance of the wood may be improved by coating it with shellac and then painting the surface. 2. How is paper such as is used to wrap butter or candy coated with paraffine? A. Unsized paper is dipped in a solution of paraffine, or else the paper is waxed by means of heat being applied to beeswax, which is then absorbed by the paper. There are several patented machines for the purpose. 3. How can I make a paste which will unite such paper? A. Use a rubber cement. See recipe given in article on "Cements" in SCIENTIFIC AMERICAN SUPPLEMENT, No. 158. 4. How can I transfer a gold leaf sign from the glass of one store window to that of another? A. We know of no means by which this can be done.

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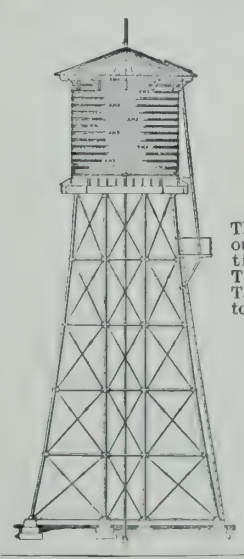
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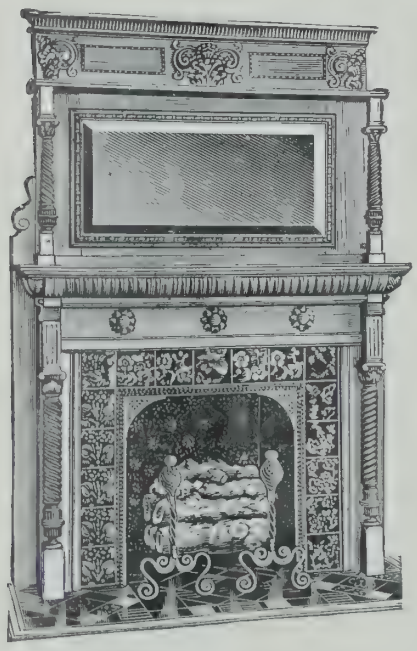
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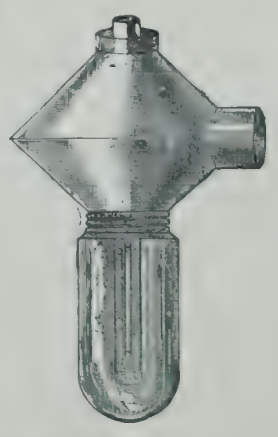
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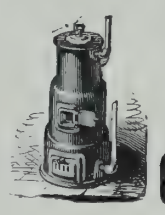
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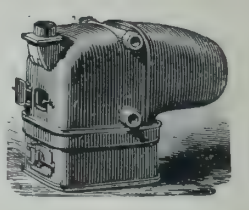


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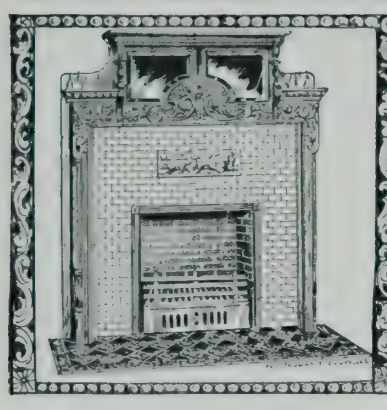
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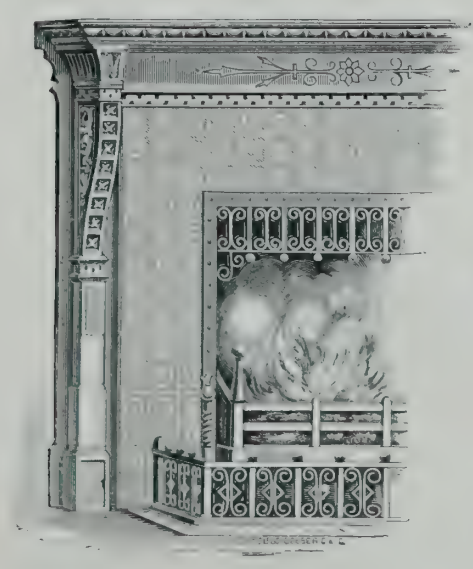
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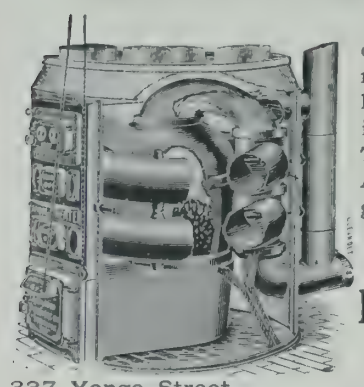
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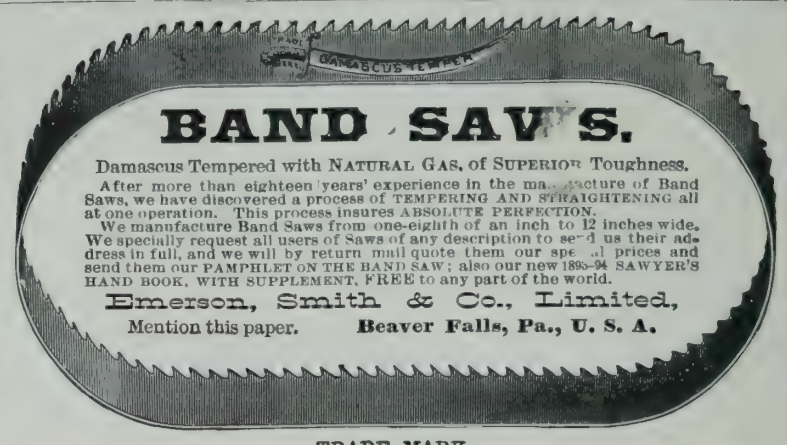
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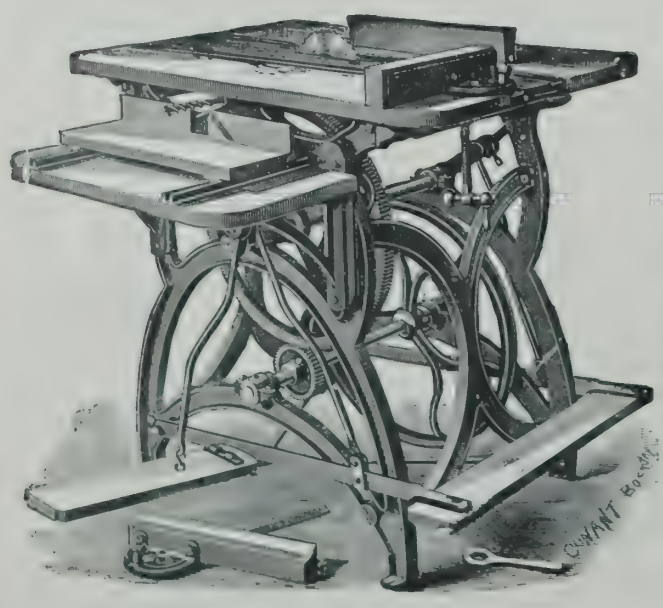
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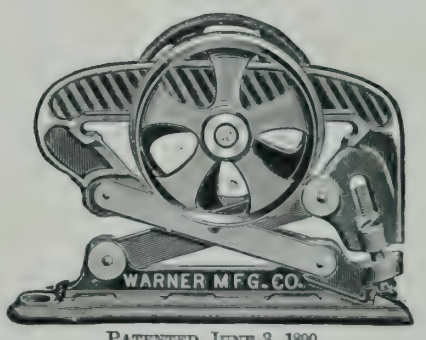
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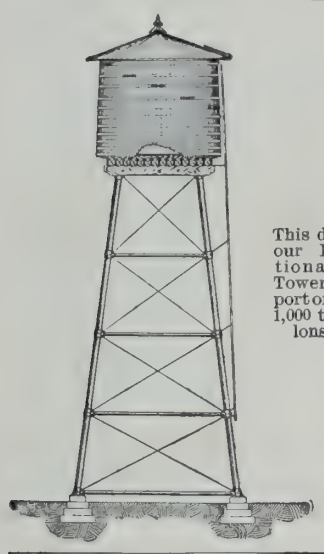
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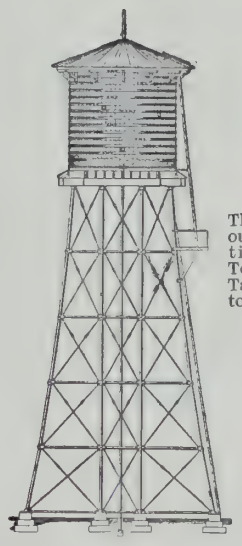
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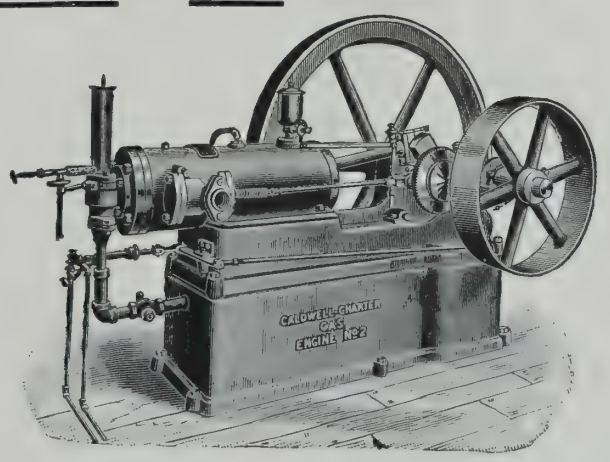
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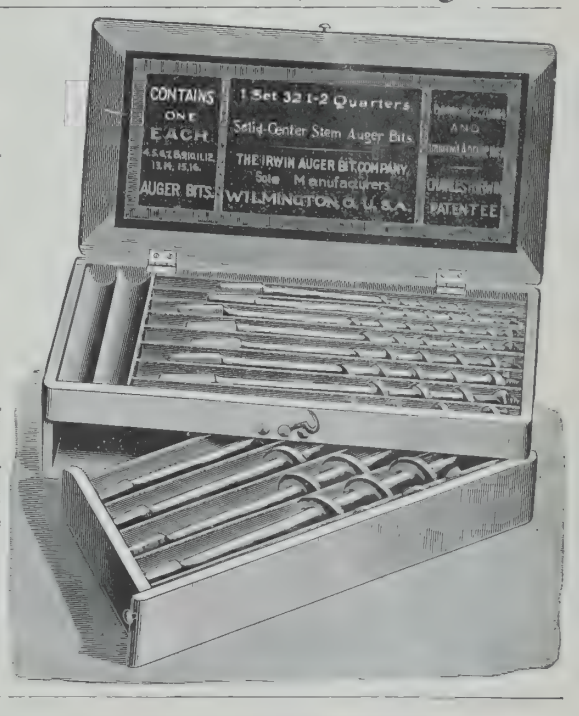
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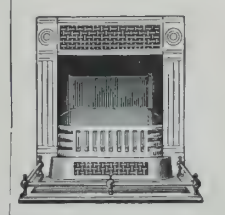
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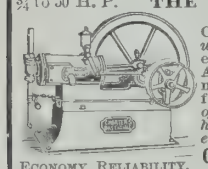
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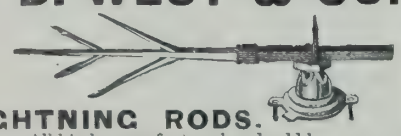
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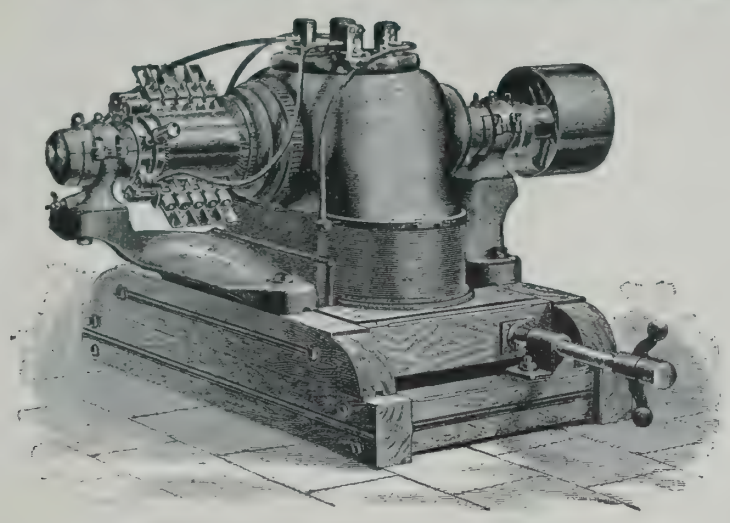
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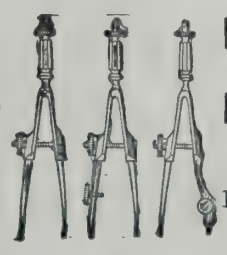
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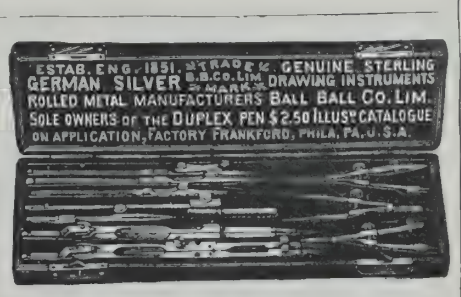
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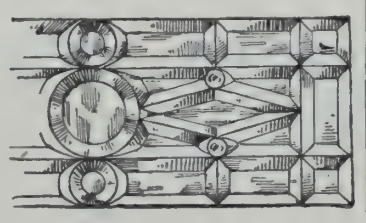
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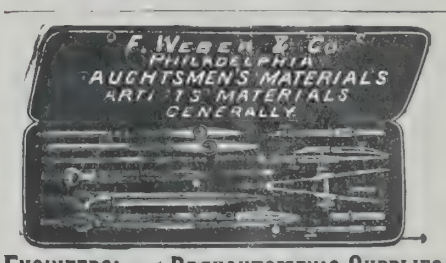
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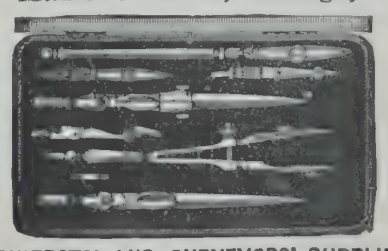
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(1) G. L. P.—The use of the siphon for the purposes of a water ram to elevate water would be of great value in a few special cases. The common water ram is so cheap and well known that it can hardly be expected to be superseded by a new device that may not be so easily managed or started. If you can make the siphon so that it can be protected from freezing as easily as a ram, it might be made profitable. We can think of but few places where it would become a necessity.

(2) W. M. S. asks if a radiator of a steam heating apparatus would throw off a black dust or smoke sufficiently to be noticed on showcases in a storeroom. A. Radiators produce a circulation of the dust held in the air, which will lodge on the showcases. There will be no apparent smoke arise, except from a freshly painted radiator.

(3) W. H. S. writes: In an article in your paper of several weeks ago, you say that in damp sawdust boxed up spontaneous combustion took place. I have stored ice in a dark entry in the barn. The ice is packed against a stone wall on one side; the other sides are boarded with four inches of space between the ice and boards, which is filled up with green, damp sawdust. I propose to cover the board sides with tar paper. Do you think there is danger of the sawdust taking fire spontaneously? A. We have not heard of ice houses taking fire from spontaneous combustion of the damp sawdust: possibly the temperature is kept down by the ice, possibly an ice house may be safe. On the other hand, we saw, only a few days since, a barrel tumbled into the street, from which smoke was issuing. Upon breaking it open it was found packed with telegraph insulators (glass) in sawdust. The sawdust was damp to the feel, and the sawdust in the central part of the barrel was on fire and well charred. How did it take fire?

(4) C. W. O.—There are a few tall chimneys in England and Scotland that were built too slender, and are affected by high winds. Brick and mortar are elastic to a certain degree, like glass or stone, and the tall chimneys sway within the limits of elasticity. The amount of deflection you state is probably overrated. You may safely divide it by 3 for a 400 foot chimney.

(5) G. R. N. desires to dye California redwood in three colors: 1, a bright red; 2, a dark blue; 3, a light yellow or golden color. A.—Red.—Take 1 quart alcohol, 3 ounces Brazil wood, ½ ounce dragon's blood, ½ ounce cochineal, 1 ounce, saffron. Steep to full strength and strain. Blue.—Indigo solution, or a concentrated hot solution of blue vitriol, followed by a dip in a solution of washing soda. Yellow.—Use turmeric dissolved in wood naphtha, or wash over with a concentrated solution of picric acid, and when dry polish the wood.

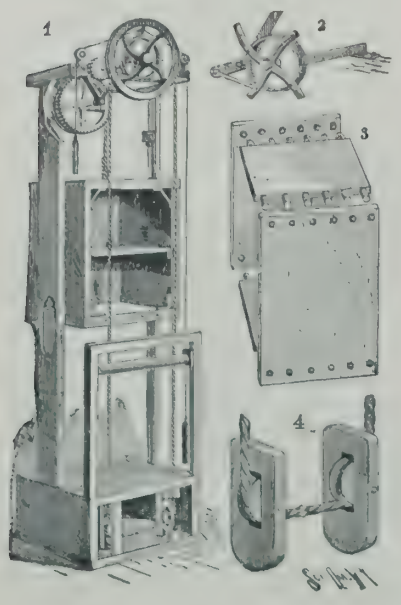
(6) D. McK. writes: I have a small coal burning stove in my dining room in which I burn coke. I am told that it is dangerous without the best of ventilation, as the deadliest of gases are generated from the coke. A. Your coke stove is all right if you have a stovepipe as used for burning coal Good coke is healthier than poor coal.

(7) W. S. asks (1) for the best stain to stain beech or cherry a mahogany color? A. For mahogany stain: Boil ½ pound madder and 2 ounces logwood chips in 1 gallon of water, and brush well over while hot. When dry, go over with pearlash solution, 2 drachms to the quart. By using it strong or weak, the color can be varied at pleasure. 2. Whether there is anything that can be used to bleach hard maple so as to give it a fine white appearance? A. Saturate as completely as possible with a clear solution of 17¼ ounces chloride of lime and 2 ounces soda crystals in 10½ pints water. In this liquid the wood is steeped for half an hour, if it does not appear to injure its texture. After this bleaching it is immersed in a solution of sulphurous acid to remove all traces of chlorine, and then washed in pure water. The sulphurous acid which may cling to the wood in spite of washing does not appear to injure it, nor alter the colors which are applied.

(8) B. D. A. writes: We have in our city 12-inch water mains and 6-inch mains. Our fire plugs have an outlet of 2½ inches diameter; where connections are made to plugs, water pressure is about 45 pounds per square inch. Will a greater amount of water be discharged from the 12-inch main than from the 6-inch main through the connections? A. The discharge will be nearly the same for all parts of the system for a single hydrant. The largest by a small percentage will be found in the hydrants nearest the source of supply. The 12-inch main, probably being nearest the source of supply, has the least friction, and will give the strongest stream.

(9) D. S. writes: The elm with us is infested by some insect; a majority of the leaves are like the one I inclose herein. What are the cause and remedies for it? A. It is impossible without better specimens to say precisely what the insect is, but we think likely that it is the canker worm, which injures the elm as well as the apple tree. The most approved remedies are as follows: To prevent the pests from going from tree to tree, a band of canvas or paper is wrapped around the trunk and besmeared with tar or a mixture of tar and molasses, which must be frequently applied; or a band of rope or closely twisted hay is put around the trunk and over this a tin band about 4 inches wide, so placed that the rope shall be at the middle of the two, in such a manner that there will be a cavity below and a free edge above it. If these insects are prevented from ascending the tree, they will deposit their eggs below the obstruction and near it, and the eggs can be

(*Continued on page* vi.)



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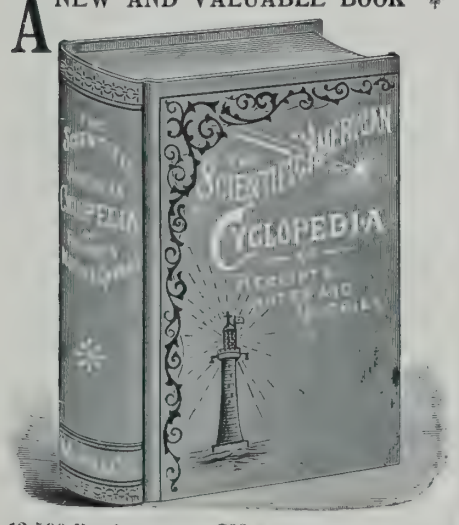
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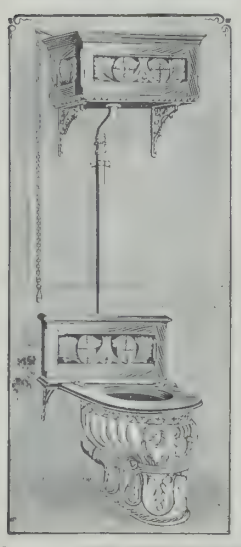


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(*Continued from page* iv.)

destroyed by a single application of kerosene oil. This should be done about March in this latitude, and earlier further South. If the worms have been permitted to hatch, as soon as they are large enough to be seen jar them from the trees and sweep away with a pole, as they hang by their threads, and burn or otherwise destroy them. If the worms have matured and gone into the ground for winter quarters, plow the ground late in the fall so as to expose the pupæ to frost and to their natural enemies. See also Professor A. S. Packard's article on the canker worm, page 304 of Scientific American Supplement, No. 19.

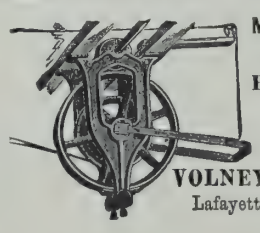
(10) J. B. R. asks: Is there always a draught up a tall chimney, and does this draught vary at times very much? If there are times when no draught at all is felt, please give conditions. If there is always a draught up a chimney, as some authorities say (even though fire is not present), why is this not perpetual motion, and, if the chimney is large enough and sufficient chimneys were built together, could not power be produced? A. The draught of cold chimneys up or down depends entirely upon a small difference of temperature between the outside and the inside, or the effect of the wind blowing across the top, which generally produces an updraught. Its power is very feeble, and cannot be considered perpetual motion, because it is due to natural causes.

(11) J. W. S. writes: Do you think there is anything in the very common notion among practical mechanics that pumps raising water to a considerable height must be down close to the water to do their best work? I have changed a deep well pump from near the water to 26 feet up from the water without any apparent loss, and it seems to me that if the piston is sufficiently tight to raise the water up to the reservoir from the piston, the water must follow up to the limit of atmospheric pressure for elevation, at which the pump is placed; however, the contrary opinion is widespread, and I would be much obliged for your judgment in the matter. A. The general opinion in regard to the position of pumps above the water surface for best work is founded upon long experience with all kinds of pumps, good, bad and indifferent. A perfect pump will work well up to 30 feet, with the only drawback of liberating air constantly from the water. With the least air leak below the pump valves, the efficiency is lessened, although not perceptible to the eye. The best principle is the best practice in setting a pump chamber, viz., close to the water.

(12) G. B. writes: I would like to put up a bell in my house and use an earth connection. Now if I connect the wire with the gas pipe on second floor, and then connect the street side of meter with the house side, would I get a good earth? If not, could you tell me how to get a better one without running a wire all the way down to the cellar? A. Your proposed plan for making the ground connection is very good. We think it will be unnecessary to make a connection around the meter.

(13) J. T. D. asks: How can we make a pond hold water where the banks and bottom are almost clear sand where we wish to make the pond? The soil is about eighteen inches deep; then comes sand, and to get the depth we want will have to go nearly two feet in sand. A. If clay can be had in the neighborhood or within a reasonable distance, the pond can be made tight with a clay and sand puddle, which, if two parts clay to one part of the sand from the excavation is used, should be fairly tight, if made six inches thick all over the bottom and sides, well compacted by ramming, then covered with six inches of the fine top loam. If required for gathering ice,

(*Continued on page* viii.)



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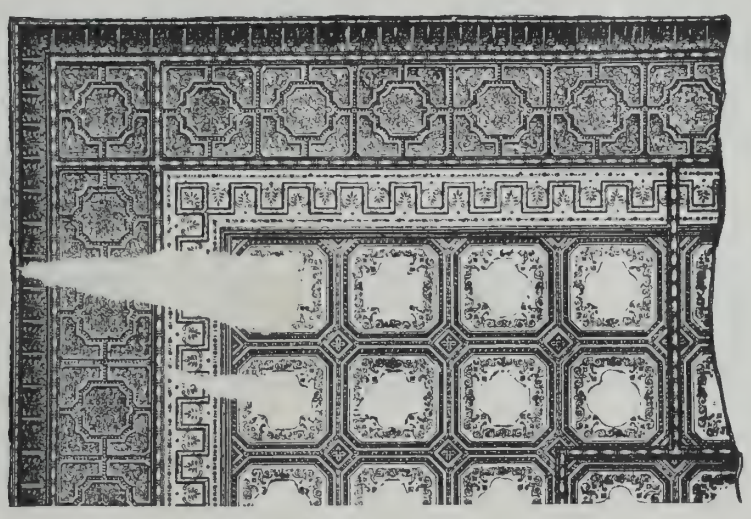
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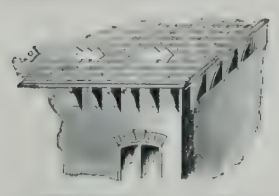
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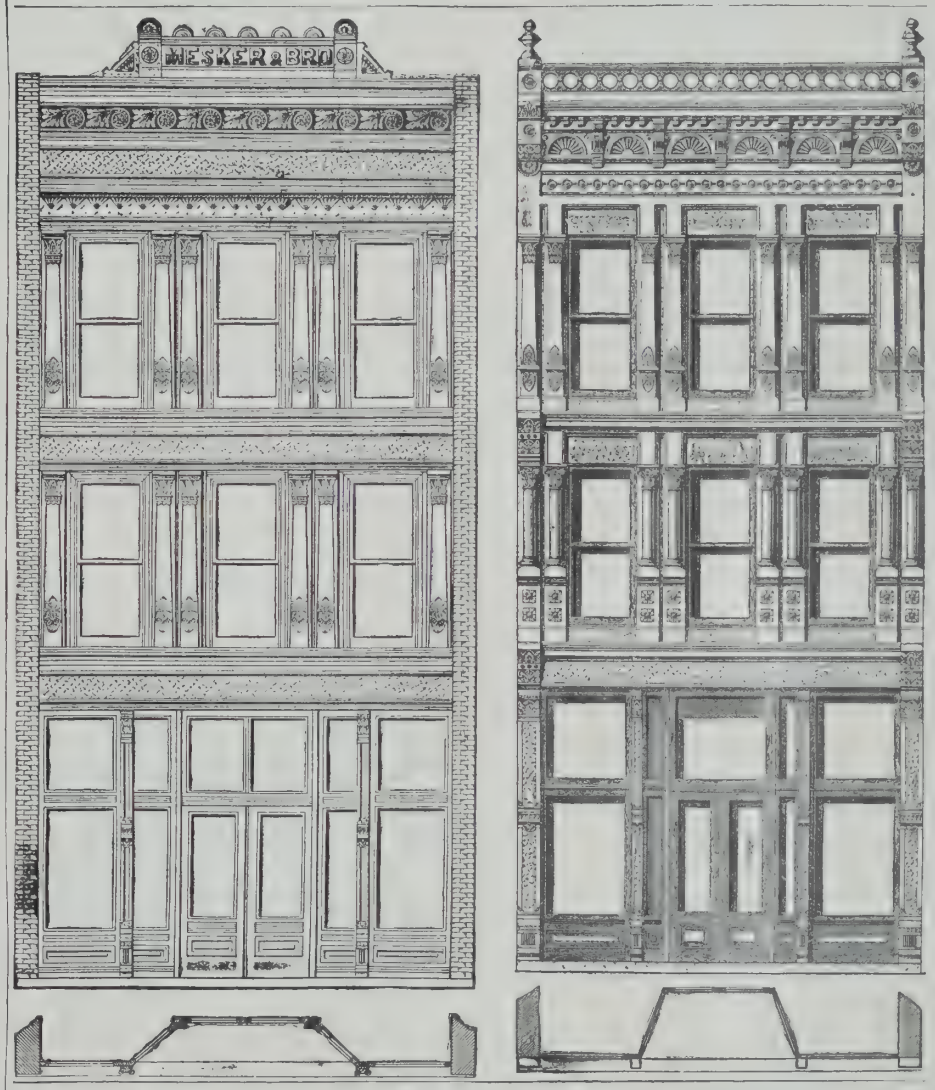
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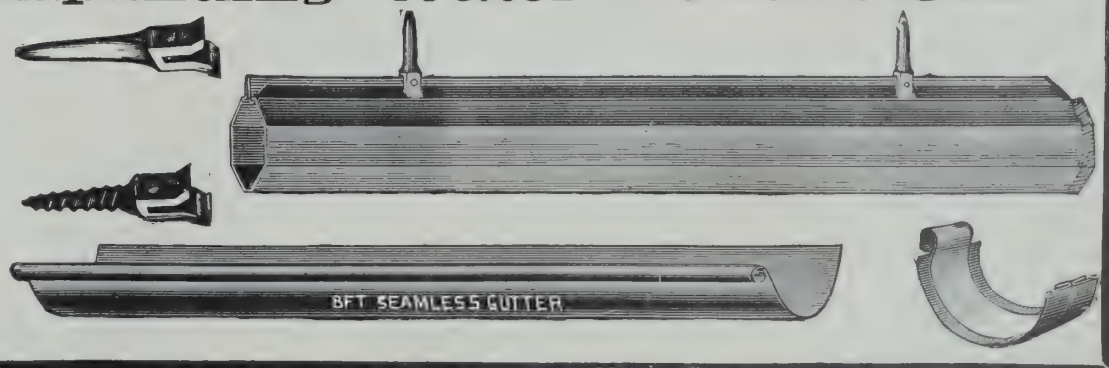
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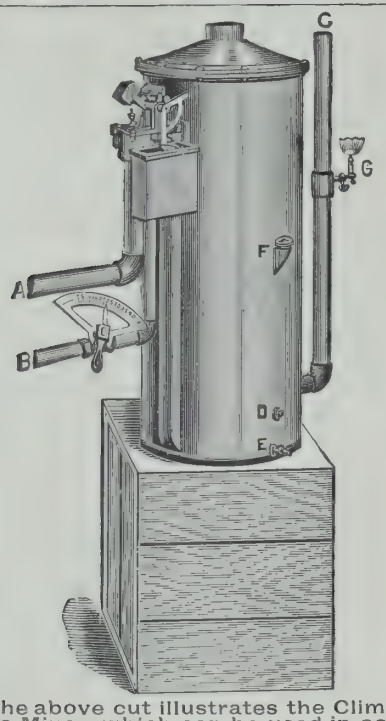


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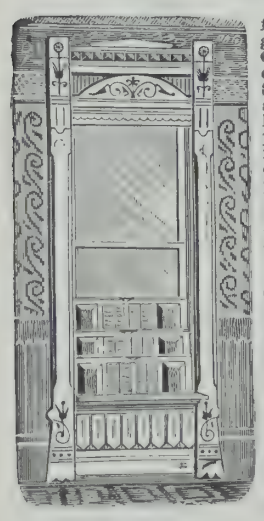
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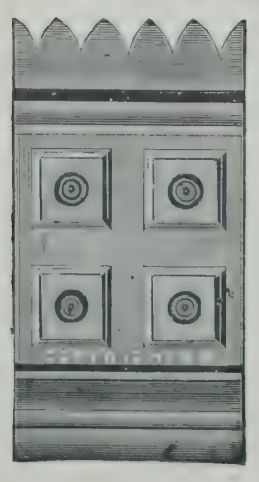
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(*Continued from page* vi.)

it should have a top dressing of coarse sand or gravel to prevent the water from becoming muddy by wind agitation. If no clay can be had, hydraulic cement should be used in the place of the clay, and which may be mixed with the sand dry by raking into the bottom and sides and wetting by sprinkling, then a top dressing of loam and gravel, as before.

(14) M. A. T. says: 1. Near our city is a gas (natural) pipe line thirteen miles in length. The first three miles are laid with six inch pipe, the remaining ten miles with eight inch pipe. The pressure at wells is 100 lb., at entrance to city it is about 25 lb. The line is laid over a hilly country. Do you think it possible to use an air compressor that will give a uniform pressure of 75 lb. at the city? If possible, how large a one and how much power will it take to drive it with? A. The laying of a new line of eight inch pipe, or even ten inch pipe, will be the most economical way of increasing the pressure at the end of the line. We cannot assign a definite size or cost of a compressor plant without knowing the present flow and proposed increase from pumping, which will require a compressor and boiler plant large enough to handle the total output of the gas well, and, although the differential pressure head would not be very great, say 50 pounds per square inch, the volume would require the operation of a very large compressor—possibly from $6,000 to $8,000 would cover the cost of the plant—and require from 150 to 200 horse power.

(15) A. H. S. writes: I have a cellar walled and arched with brick, cemented inside with Portland cement, top, sides and bottom. I have it thoroughly drained. When the atmosphere is dry the walls of the cellar are dry, but when the atmosphere is moist (as, for instance, two or three days before a storm) the walls begin to sweat, which will gather in large drops and run down to the floor, making a puddle of water. What can I apply to the walls to stop this condensation? A. The best remedy for condensation on a cellar wall is to fir off, lath and plaster, on all parts exposed to earth backing. Only a non-conducting material between the wall and the moist earth will prevent the condensation. A covering of felting would do, but should be made of asbestos or mineral wool to avoid any unpleasant odor.

(16) J. T. D. says: I wish to build a reservoir for holding water. I want it to cover about two acres for cutting ice from. The ground upon which I wish to construct pond is partly clay and partly black loam. Can you tell me what is necessary in order to make it hold water, as I expect to get my water supply from wells outside to pond? A. In excavating for an ice pond in a mixed soil of clay and loam, the loam should be carried to the banks, and the clay saved for a clay and sand or clay and loam

(*Continued on page* xi.)

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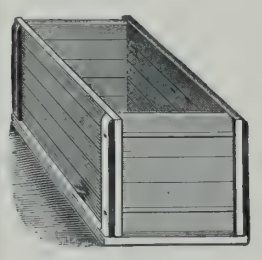
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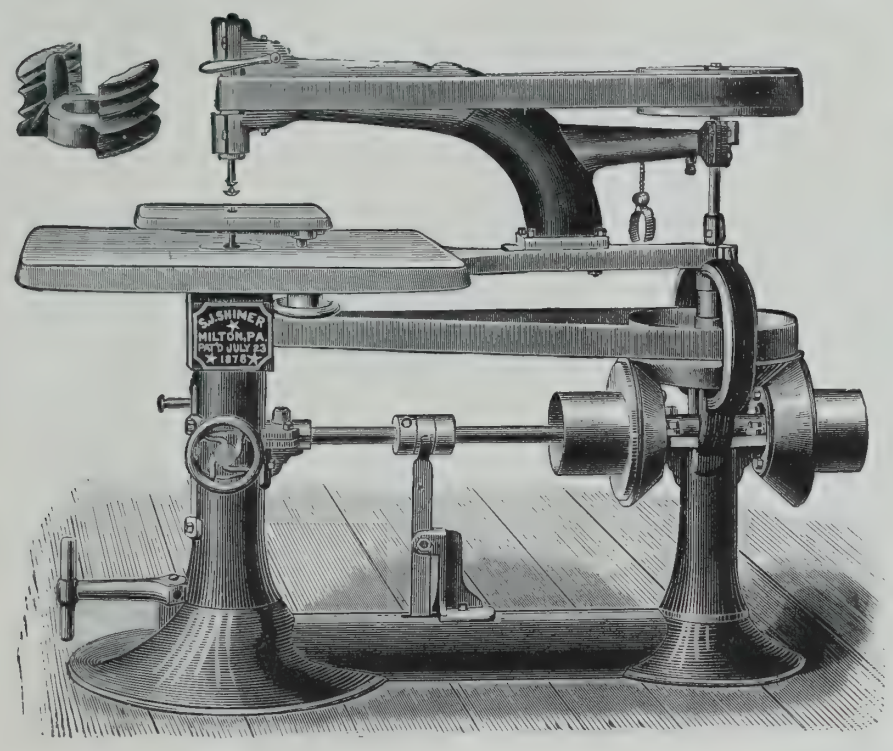
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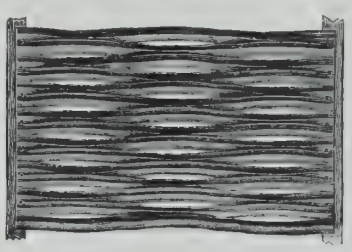
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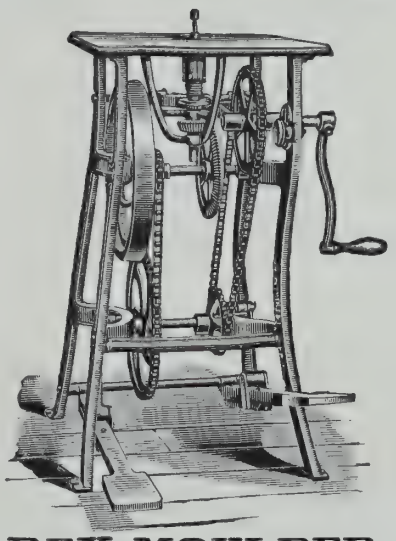
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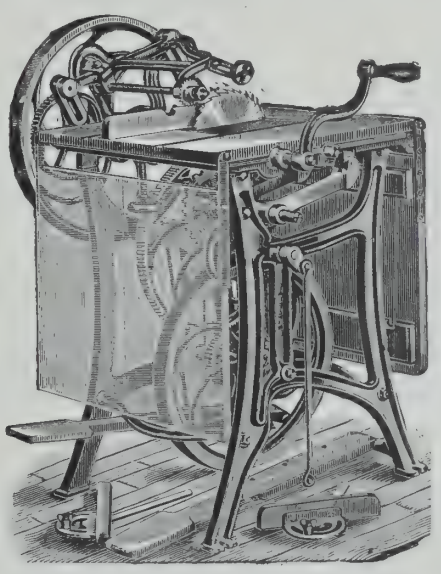
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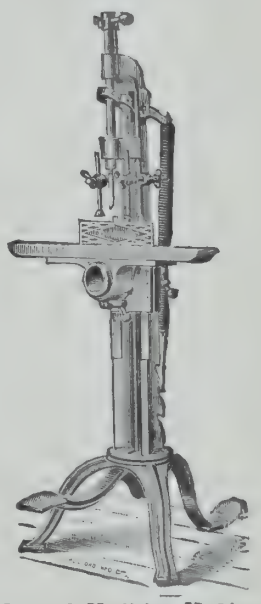


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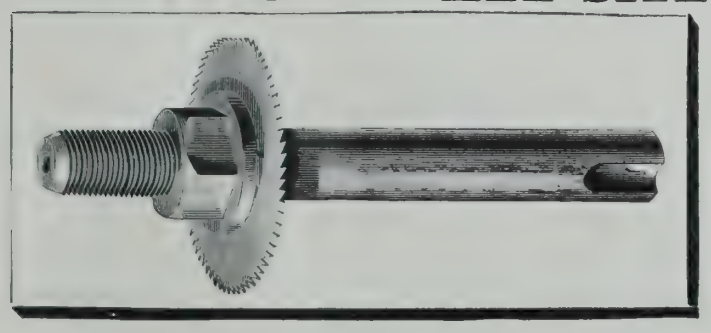
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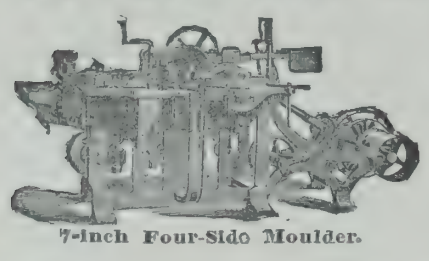
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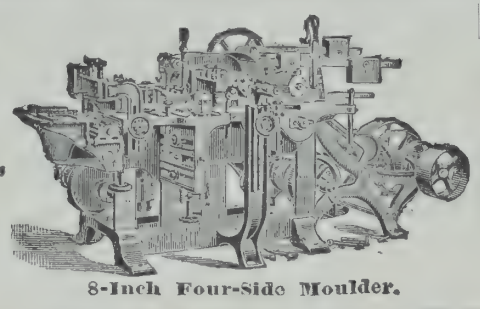
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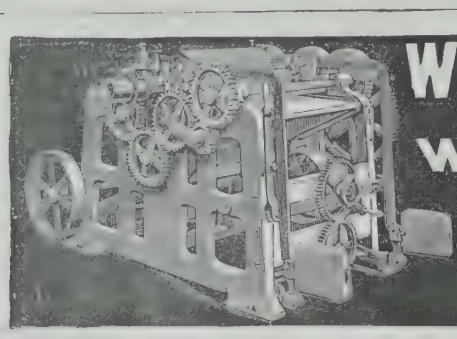
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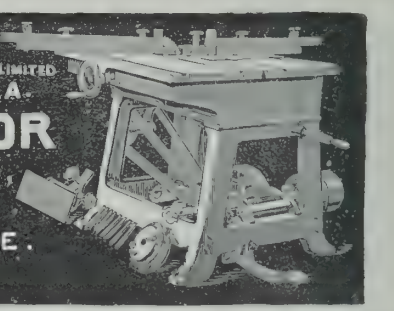
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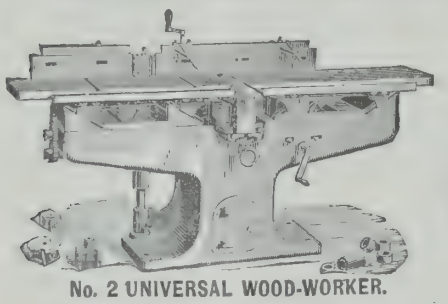
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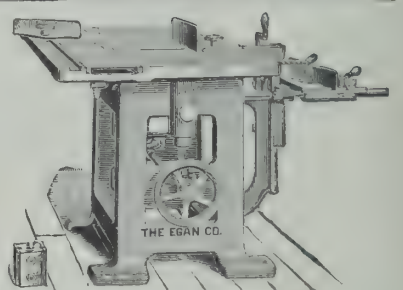
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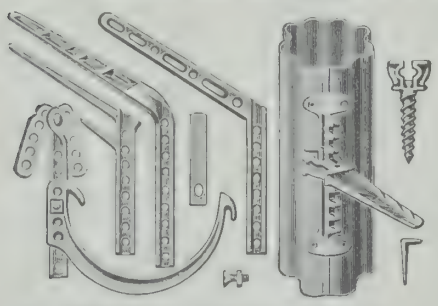
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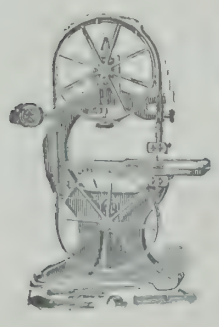
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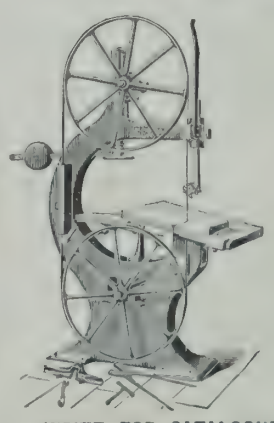
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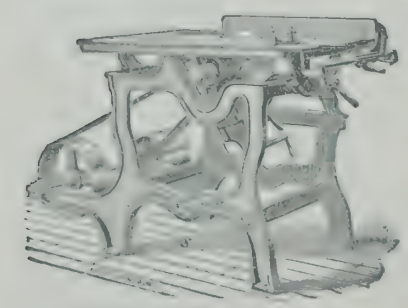
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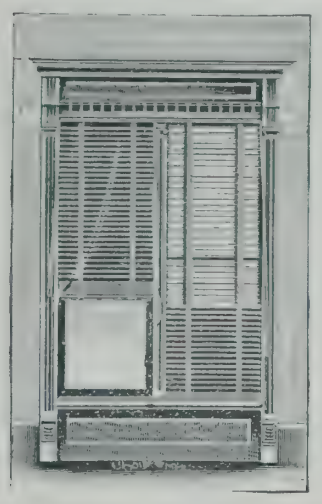
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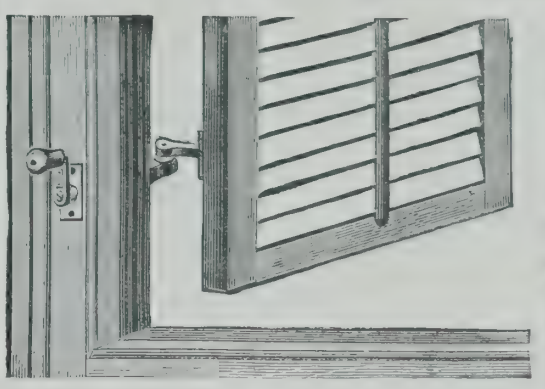
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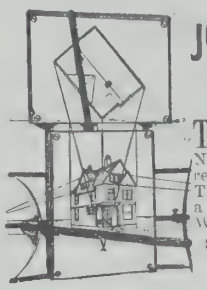


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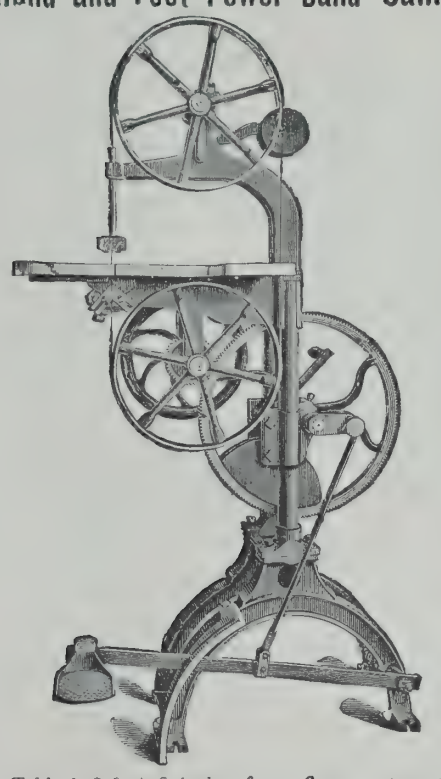


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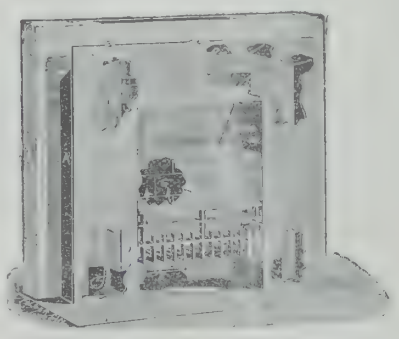
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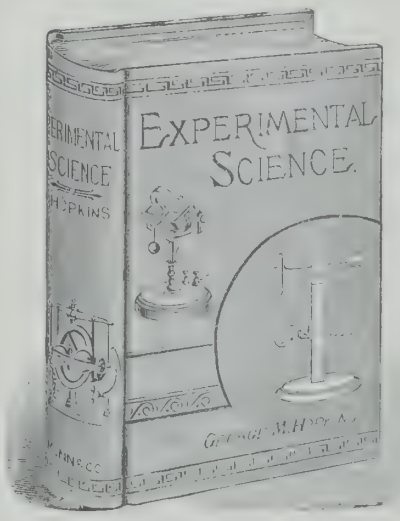
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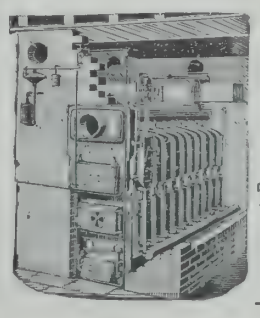
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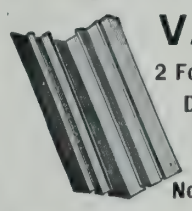
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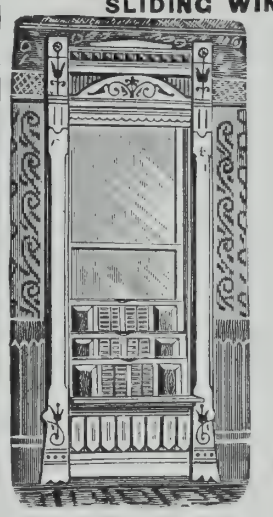
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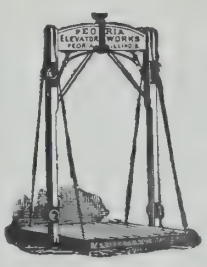
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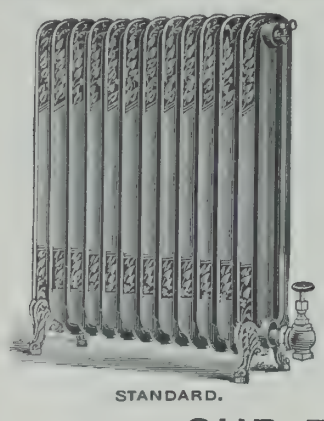
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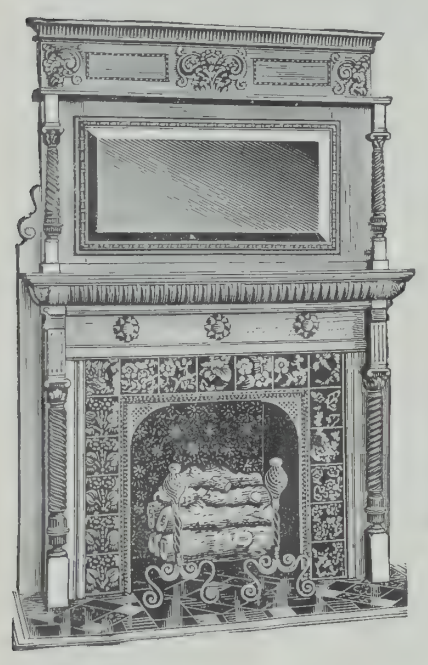
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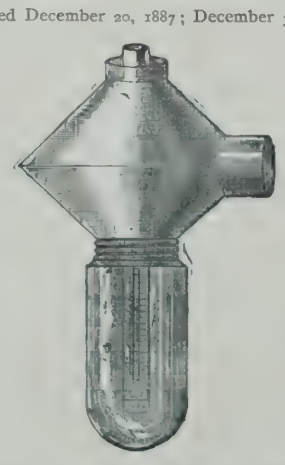
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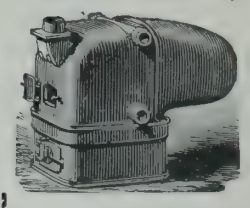


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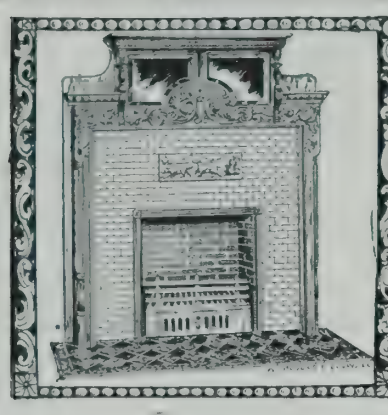
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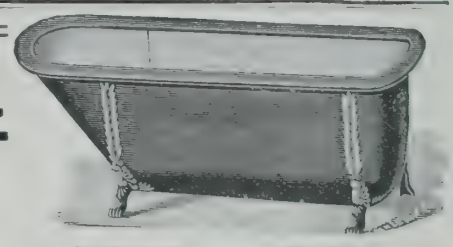
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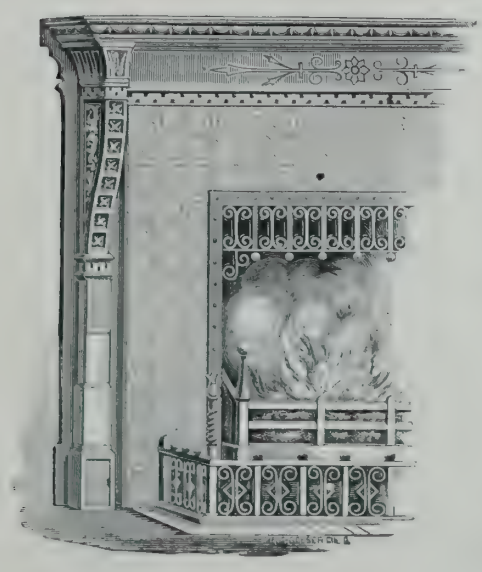
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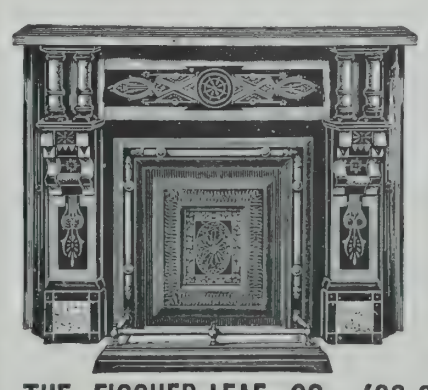
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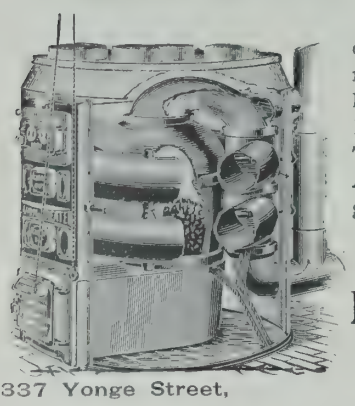
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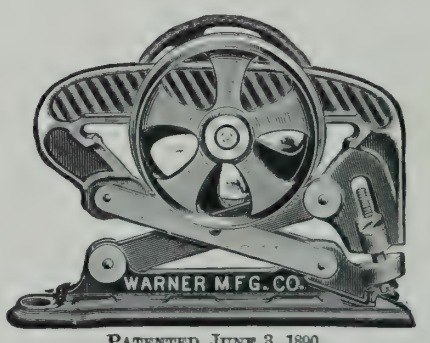
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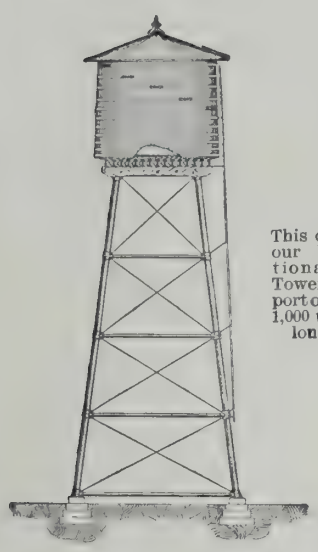
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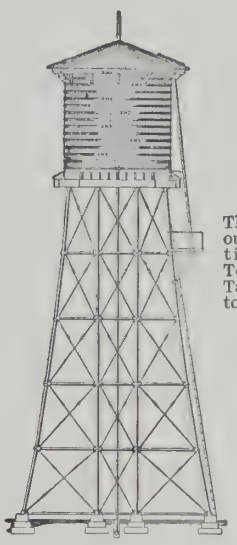
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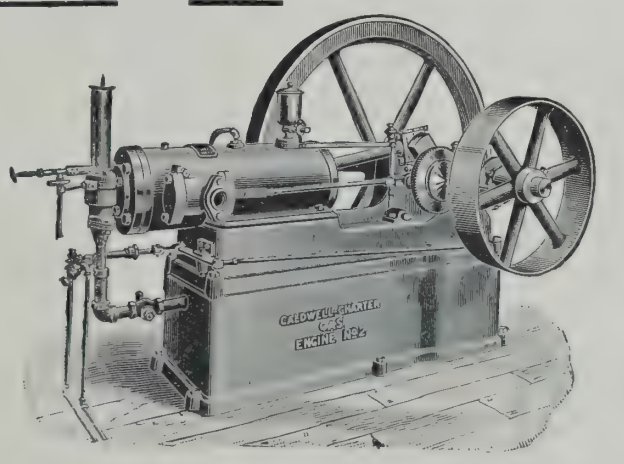
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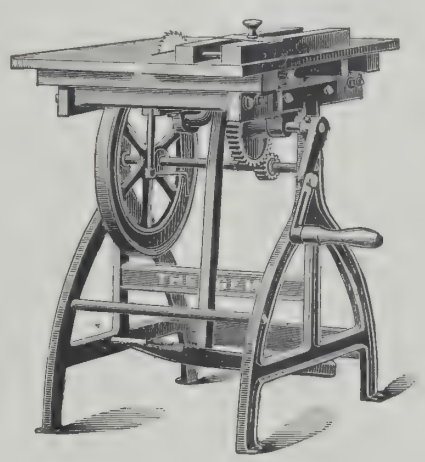


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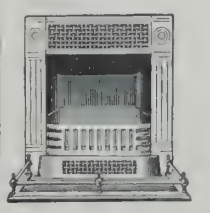


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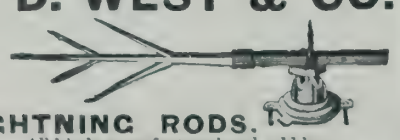
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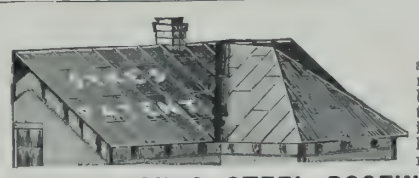
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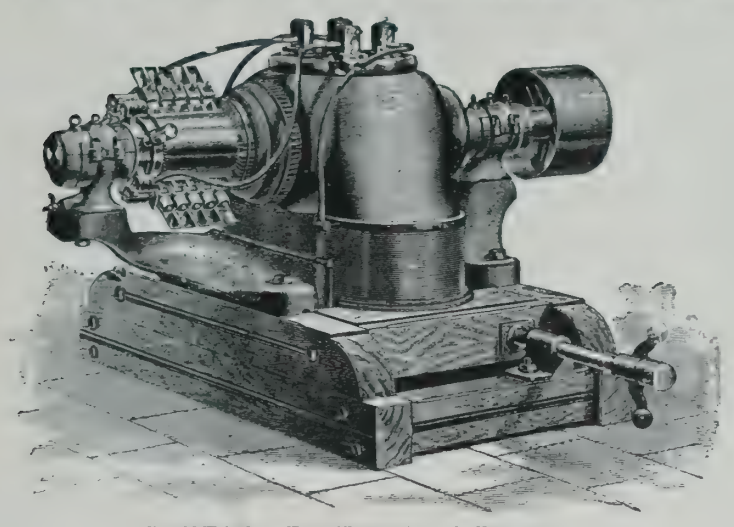
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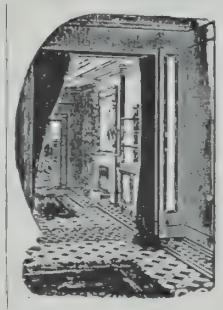
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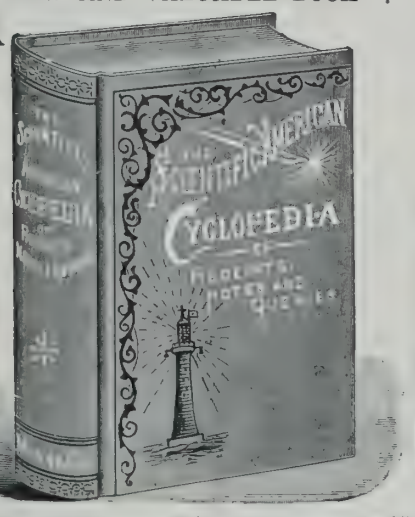
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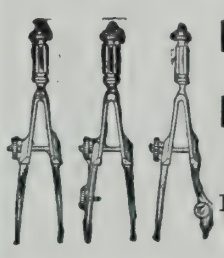
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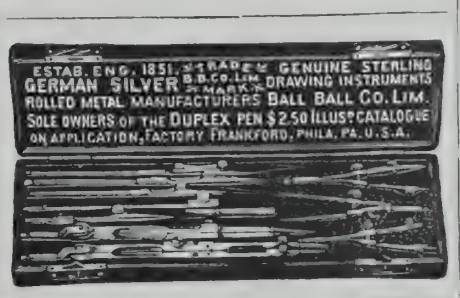
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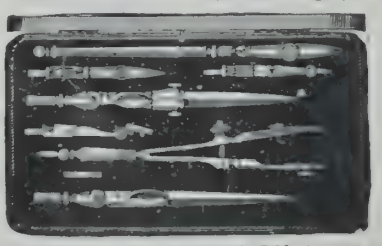
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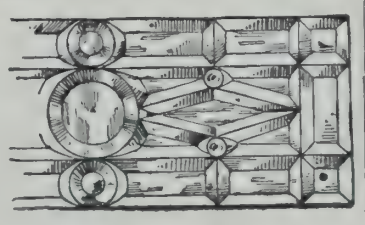
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(2) W. L. F. says: 1. Will you kindly let me know what I can use to remove rust spots from white marble? A. Turpentine, 2¼ tablespoonfuls; lye, 1½ gills; ox gall, 1½ ounces; pipe clay, q. s. to make a paste. Apply the paste to the stain and let it remain for several days. Iron mould or ink spots may be taken out by dissolving in 1½ pints rain water, 1½ ounces oxalic acid, ¾ ounce butter antimony, flour sufficient to make the mixture of a proper consistency. Put on with a brush, let it remain a few days, wash off. Grease spots may be removed by applying common clay saturated with benzine. 2. Also something to remove moss from brownstone where flower pots have been standing? A. Mildew stains on brown sandstone are very difficult to remove, except by refinishing, but the appearance of the stone can be improved by scrubbing the mildewed stones with a strong solution of caustic soda in water.

(3) G. R. C. writes: In a residence which I am building I desire to put in water closet and bathroom. Our city has water works, but no sewerage. How can I arrange a cesspool so that it will be perfectly safe? Our soil below the surface is hard clay, with no vein of sand or gravel, but we find water at a depth of about twenty feet. A. A city with water works and no sewers is in something of a dilemma in the manner of disposal of the larger quantity of sewerage natural to a water supply system. If there are no wells, it is safe to dig cesspools as deep into the water stratum as practicable for present use. If neighbors have wells drawing from the water stratum, then cesspools are more or less dangerous. If made, they should be shallow and tight, and arranged for the convenience of pumping into tank carts for removal to a safe distance.

(4) S. H. writes: I wish to convey hot mineral water from the hot springs to my house. The distance is about two miles and one-eighth, with about 50 feet fall. I wish to know if you know of any one who makes an auger that will bore pump stocks from 8 to 10 feet long, and cleanse themselves, size 2 inch bore. A. Ames Manufacturing Co., Chicopee, Mass., manufacture pump augers and reamers for making wooden pipe and pumps.

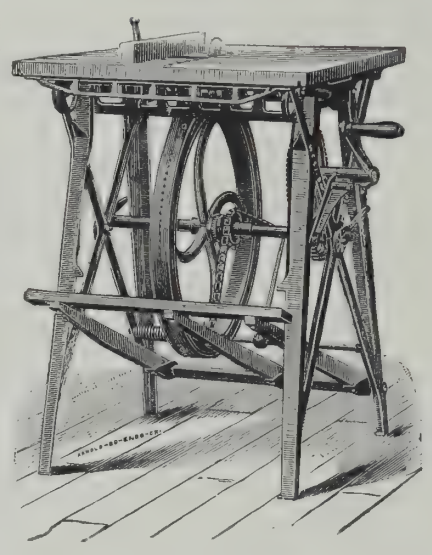
(5) Constant Reader writes: Will you kindly inform me through your valuable paper the component parts of concrete? I saw in your paper a long time ago (I did not need to use it then) an article respecting a building, I think, in England, where they had used saccharine in some form, which had a hardening effect upon it, which is very important. If so, please state how much may be used in a given quantity. Please give all the information you can, as I want to build a large building with that material, if I can be persuaded it will be sufficiently strong. A. The proportions for concrete vary somewhat, depending upon the nature of the work and required strength. With the best American hydraulic cements, 1 part by measure to 2 parts sand, with an equal bulk of broken stone, makes a good strong concrete for pressure in the foundations of buildings and for walls. This may be varied to 1 part cement, 3 parts sand, 4 parts broken stone, for ordinary subwork. The use of sugar in mortar has been proved highly beneficial to its strength and hardness, and also enables bricklaying to be carried on in frosty weather, as such mortar does not freeze at several degrees below the freezing point. The proportion of 2 pounds of common brown sugar to 1 bushel of lime and 2 bushels of sand makes a mortar that sets as hard as cement and much quicker than ordinary mortar. As the sugar is supposed to be a solvent of lime, it should be added to mortar in a thin sirup, the previous mixed mortar being as thick as it is possible to work it. The affinity of the sugar for the lime seems to partially dehydrate it and set free some water that thins the mortar. One pound of sugar to 16 gallons of water with the necessary lime makes a very hard and durable whitewash.

(6) B. H. C. writes: I wish you would answer W. H. C.'s question, issue of August 19, more explicitly. Why are nails called penny, as three penny, four penny, etc.? A. The term penny, when used to mark the size of nails, is supposed to be a corruption of pound. Thus a three penny nail was such that 1,000 of them weighed three pounds, a four penny such that 1,000 weighed four pounds and so on.

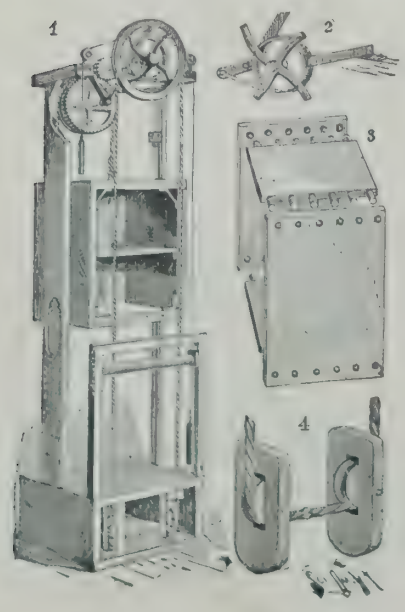
(7) W. G. R. asks: What horsepower boiler will be required to heat a house 45 x 38, and ell 18 x 30, two stories high, and two rooms in attic 14 x 18?

(*Continued on page* vi.)

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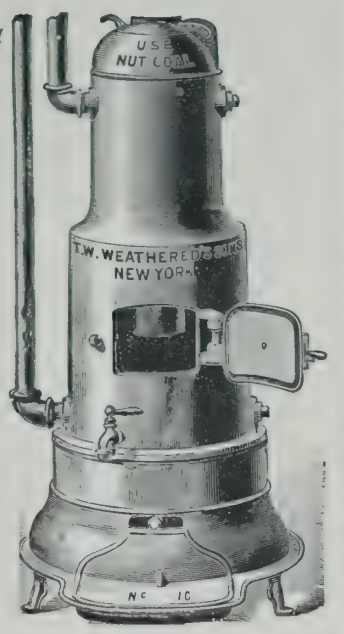
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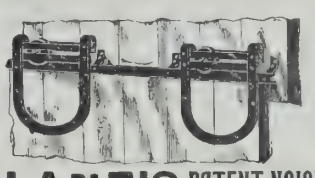
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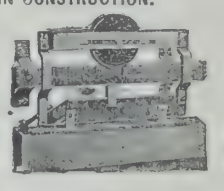
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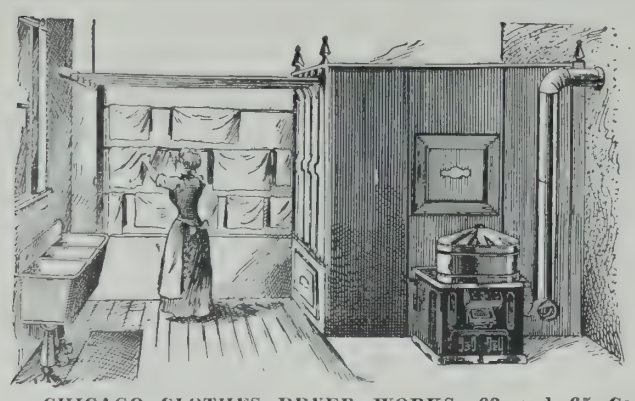
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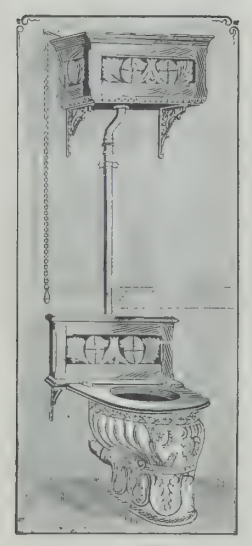


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(*Continued from page* iv.)

Also amount of steam pressure. How do you compute the above? Is there any way of maintaining a pressure on water pipes so as to have running water in second story without having a supply tank overhead? If so, what is it? A. Assuming that your ceilings average ten feet high, and for the winter climate of Vermont, you will need a five horsepower boiler, having a fire heating surface of 75 square feet. From absence of details we assume the house to contain 50,000 cubic feet of space, which requires one square foot of radiating surface in rooms for each hundred cubic feet of space, variable according to exposure and situation of rooms. This will make 500 square feet of pipe surface, and the boiler should have one-eighth of the radiating surface in its heating surface, or 62 square feet. It is safe to make it 75 square feet. Pressure in water pipe can only be maintained from an overhead tank or the continued action of a pump.

(8) A. Y. writes: A recent test for pressure of our village water works, a Shaffer-Budenberg gauge being used, indicated 180 pounds, for which I claim the head in feet should be not less than 425. A party employed as foreman in the construction of these works, and who thereby has acquired a quasi-reputation in our midst as an authority upon hydraulic matters, asserts that the head is only about 250 feet, that the high pressure is owing to the careful manner in which the pipes were laid, as avoiding angles or deflections. Will you kindly set at rest this country store controversy, and possibly educate this engineer? A. The hydrostatic head due to the gauge pressure is 414 pounds per square inch. If the gauge is located at some distance from the source, the friction head should also be added to the gauge pressure, which may carry the pressure up to your figure. The careful manner of avoiding curves would lessen the otherwise friction head, but could not make it less than the static head at the point of gauge connection.

(9) Z. B. writes: During the last summer, on the afternoon of a day in August, a large barn was burned here by lightning. The cloud passed over unattended by rain, and the occurrence was most sudden and terrifying. Workmen engaged in the open field in the vicinity affirm they saw no lightning, a circumstance probably not unusual in similar cases. But they affirm, moreover, that the stroke upon the building was heard in advance of hearing the sound of the thunder. Could this be the fact? A. We see no inconsistency in the occurrence. The thunder may have been produced at a point remote from the barn.

(10) J. S. M. asks: Can 20 to 30 tons of ice be put up in one ice house and kept satisfactorily? About what would be the percentage of loss in one season? How large an ice house will be required, and how should it be constructed? A. Ice in quantities of 20 and 30 tons can be stored to advantage, and with a loss of no more than 10 per cent. when packed with ordinary care. Thirty tons will occupy a space or 10 x 10 x 10 feet, or 1,000 cubic feet, with 8 inches all around the inside, and 3 feet at the top. for packing, which may be hay or sawdust. A peak roof, ventilated, and, if possible, the ice house shaded from the sun. See Scientific American Supplement, No. 59, for construction of ice houses and cold storage rooms: 10c., mailed.

(11) Hercules, New Haven, asks: Do you consider it safe to pile about 600 tons of pig iron in a space of 60 feet by 6 feet within 3 feet of the foundations of a five story factory building, the three upper stories running light machinery? The building is built on filled-in ground, and is piled throughout its 600 feet in length. A. The space occupied is

(*Continued on page* viii.)



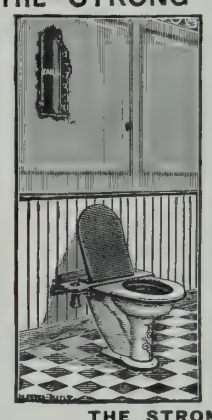
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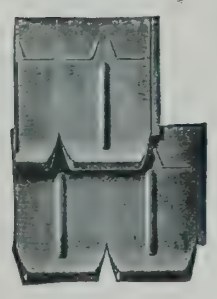
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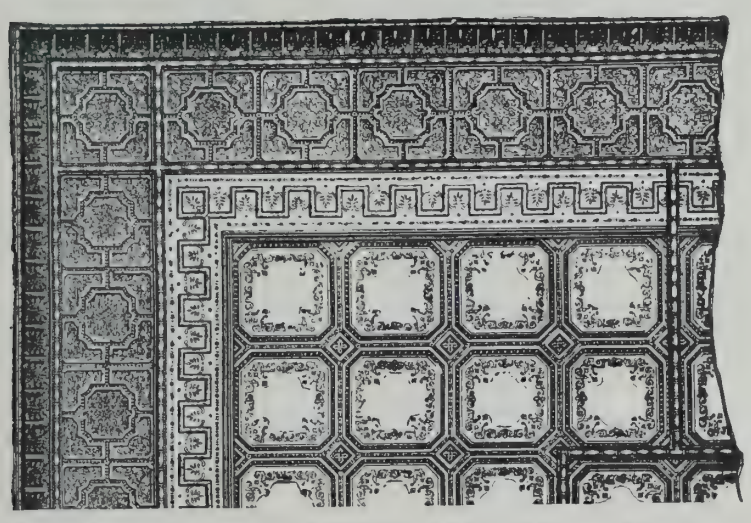
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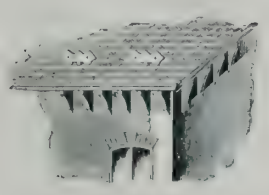


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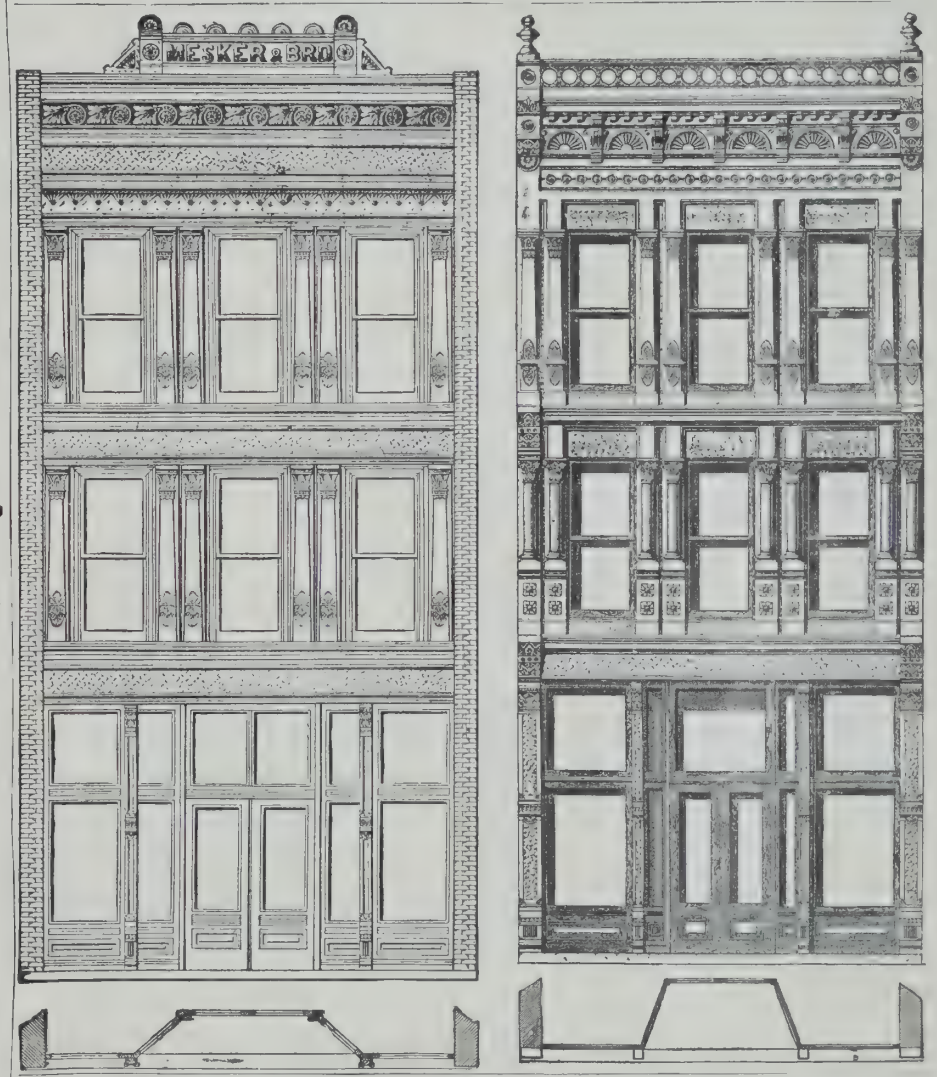
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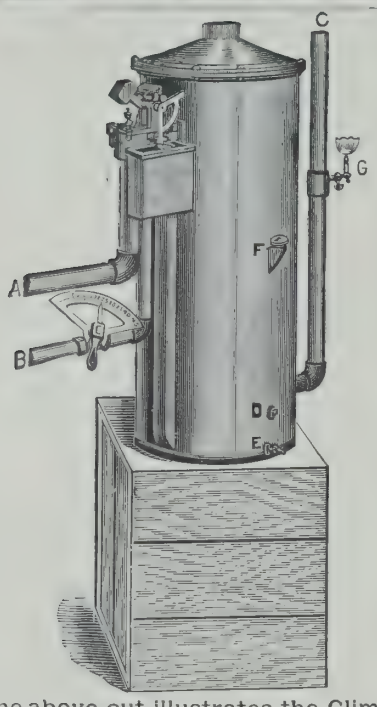
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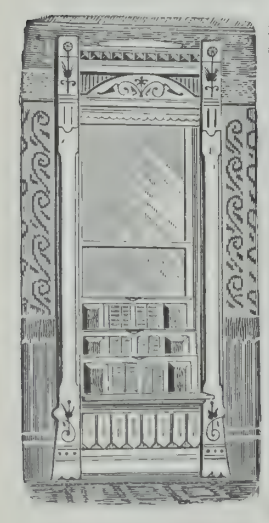
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(*Continued from page* vi.)

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(12) E. R. P. writes for explanation of the following phenomenon: Pine Bluff, Ark., Sept. 29.—A tremendous rain poured down here this evening, and with it came millions of small frogs. They got into many stores, and the principal streets in the business part of the town were so covered with them that it was difficult to walk. A. The appearance of frogs and other small animals during heavy rain storms may be due to two sources, either lifted from shallow ponds or marshes by a tornado or waterspout, and distributed along the path of the storm, or that the excessive rain has driven them from their burrows and hiding places to the surface of the ground. If in the above statement the animals were really frogs, they may have fallen as stated. If they were toads, they were probably driven from their holes by the rain. We think the millions would be nearer the truth if much divided.

(13) N. F. Library, Newton, Kans., asks if water can be lifted from the bottom of a well 100 feet deep, 85 feet of water in it, by putting a check valve every 16 feet in the pipe, a foot valve at the bottom of pipe, the pipe filled with water. Or is it possible to lift it over 33 feet? A. The check valves are of no value in adding to the lift of the pump, but rather a hindrance, by their weight. Water in solid column can only be lifted possibly 33 feet, but practically about 28 feet from the pump bucket.

(14) M. L., Jr., writes: A fire alarm telegraph wire goes over the house I am in. It is held in place by a glass insulator at the ridge of the roof. Now, I have an electric bell, such as are used for door calls, etc., which I would like to connect with this fire alarm wire, if I can, without cutting it. A. By connecting the wire with the fire telegraph wire, running it to your bell, and from the bell to a good ground, you will be able to get the alarm; but we think you would render yourself liable by such an operation, and might also interfere with the efficiency of the fire alarm telegraph.

(15) C. A. B., Iowa, writes: 1. While riding in the river bottom one day this fall, I noticed that the corn on one side of the road was badly frozen, while that on the other side was comparatively unharmed. Quality of ground seemed to be the same in both fields, and the elevation of the

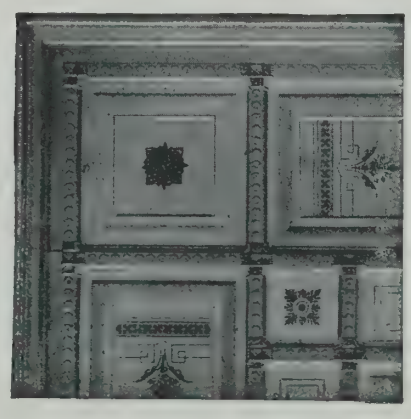
(*Continued on page* xi.)

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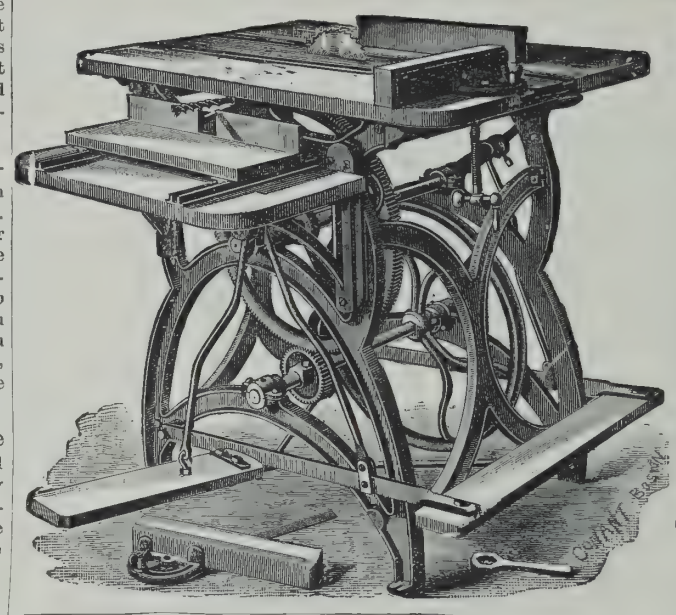
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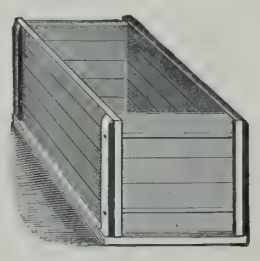
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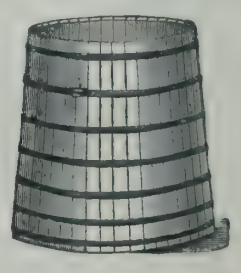
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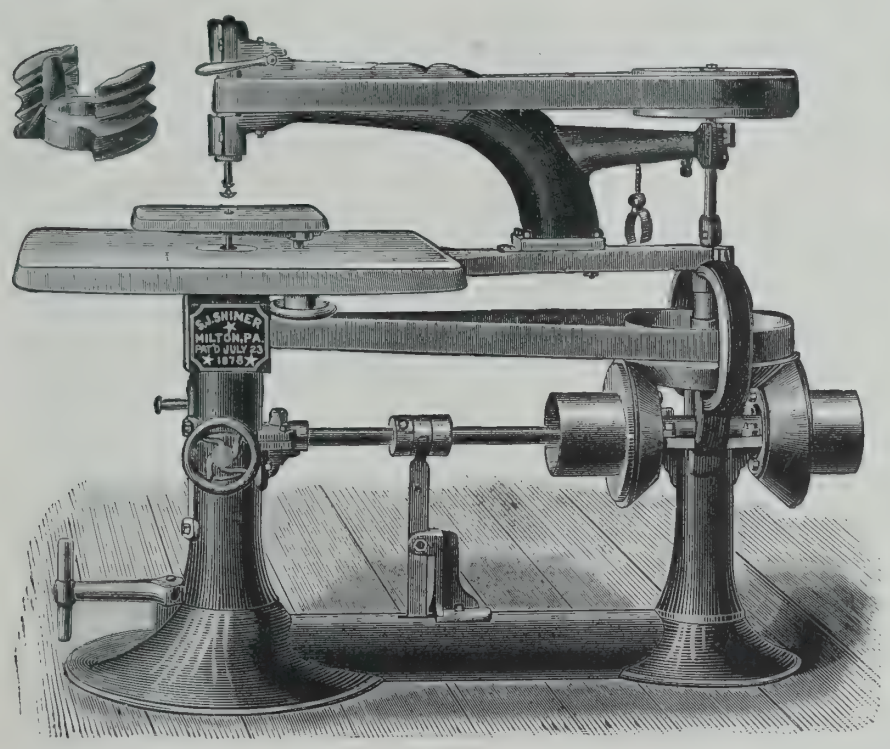
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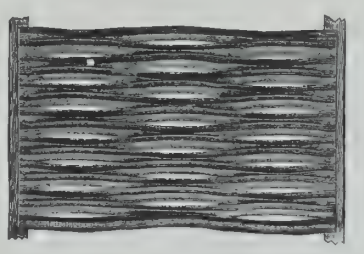
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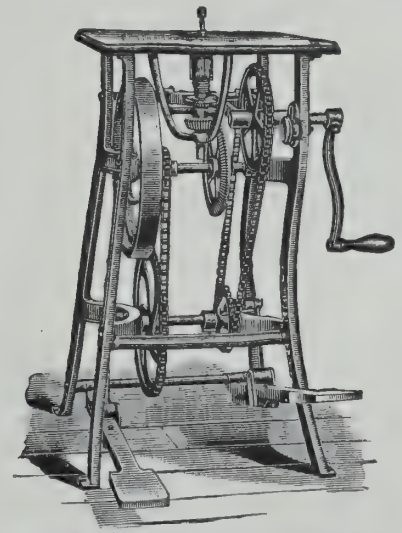


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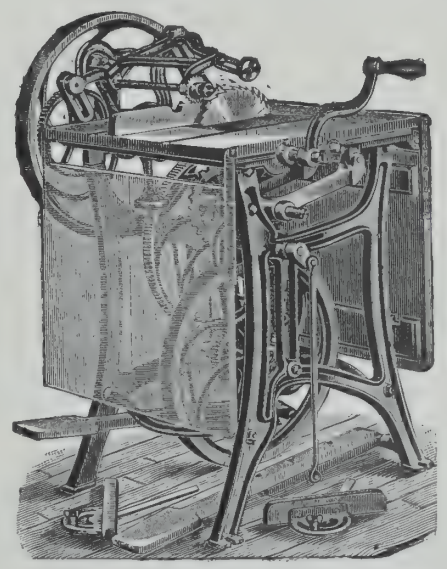
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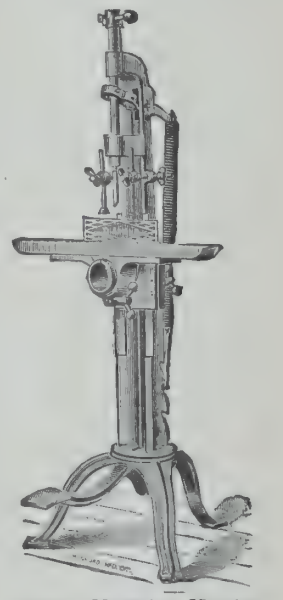


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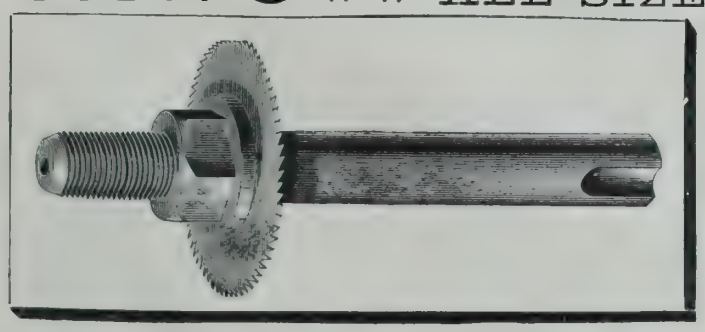
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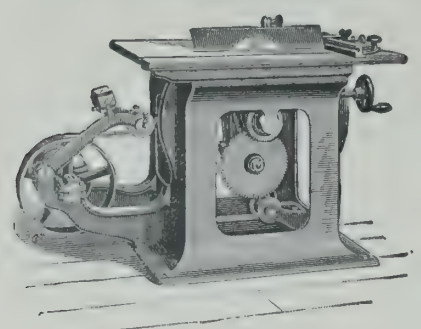
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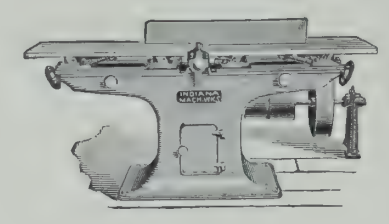
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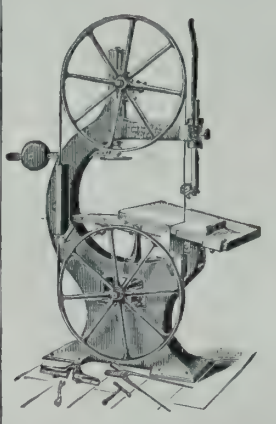
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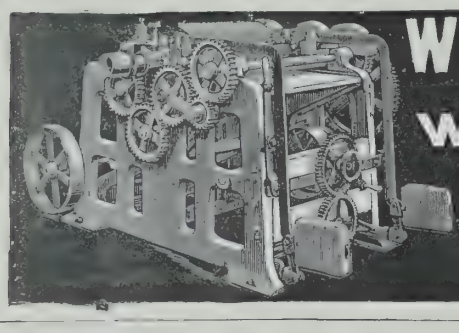
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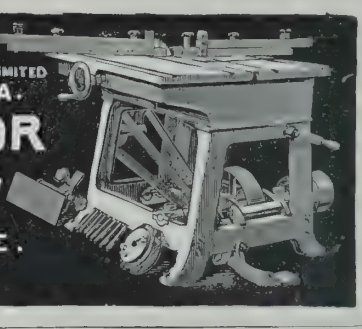
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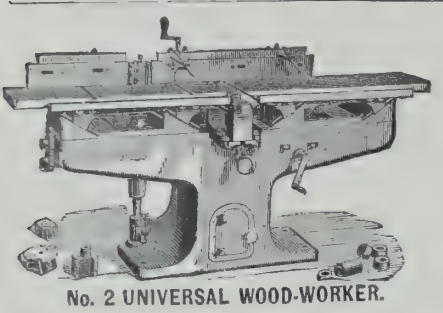
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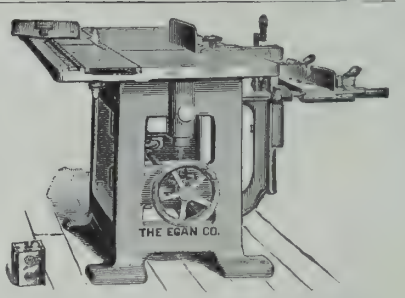
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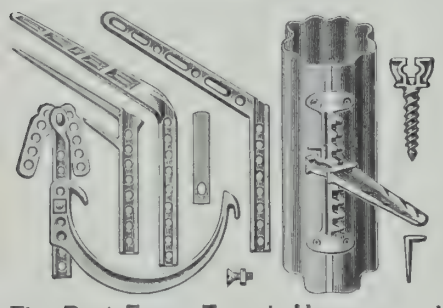
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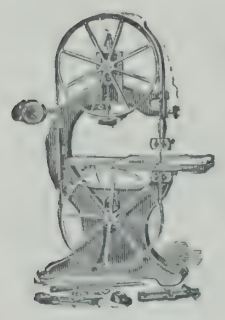
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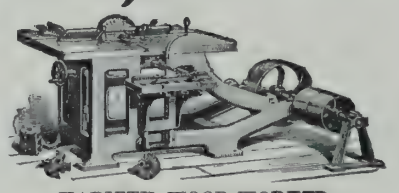
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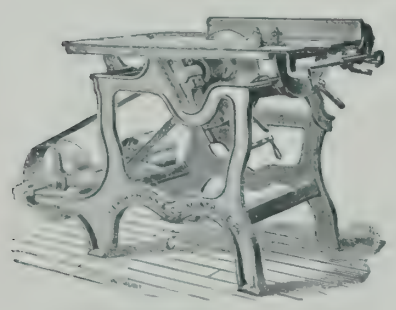
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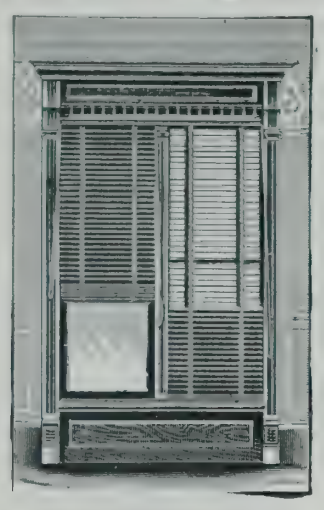
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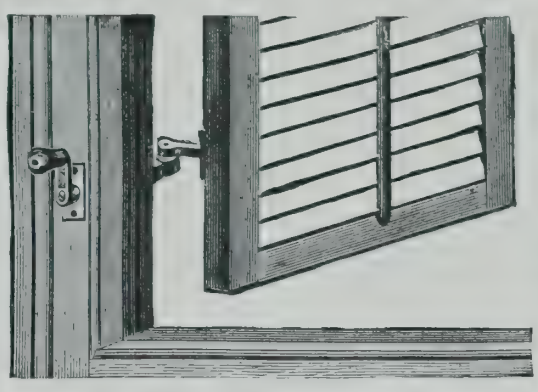
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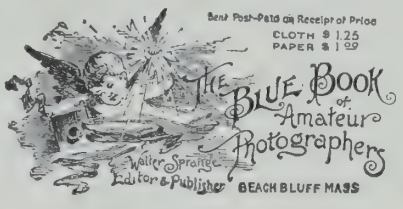
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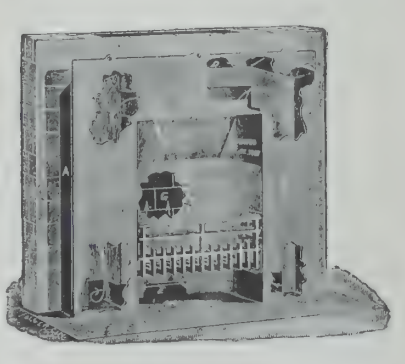
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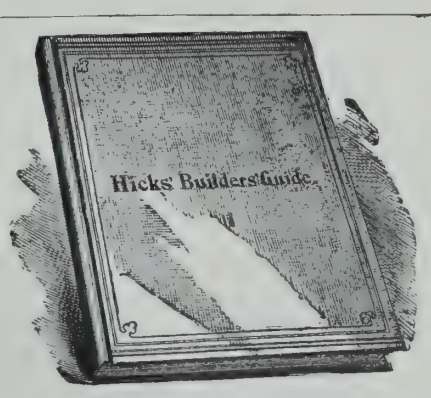
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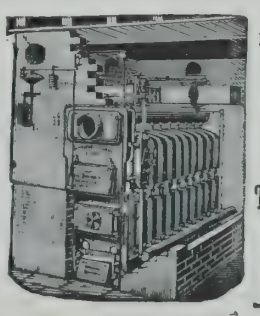
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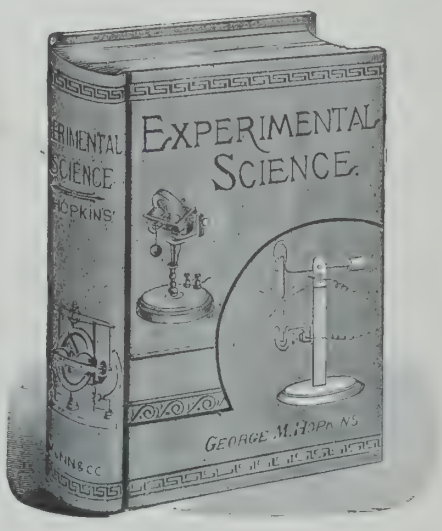
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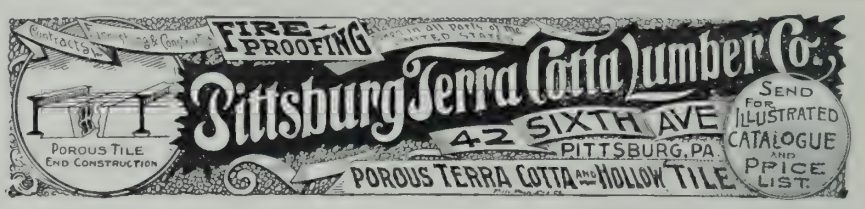
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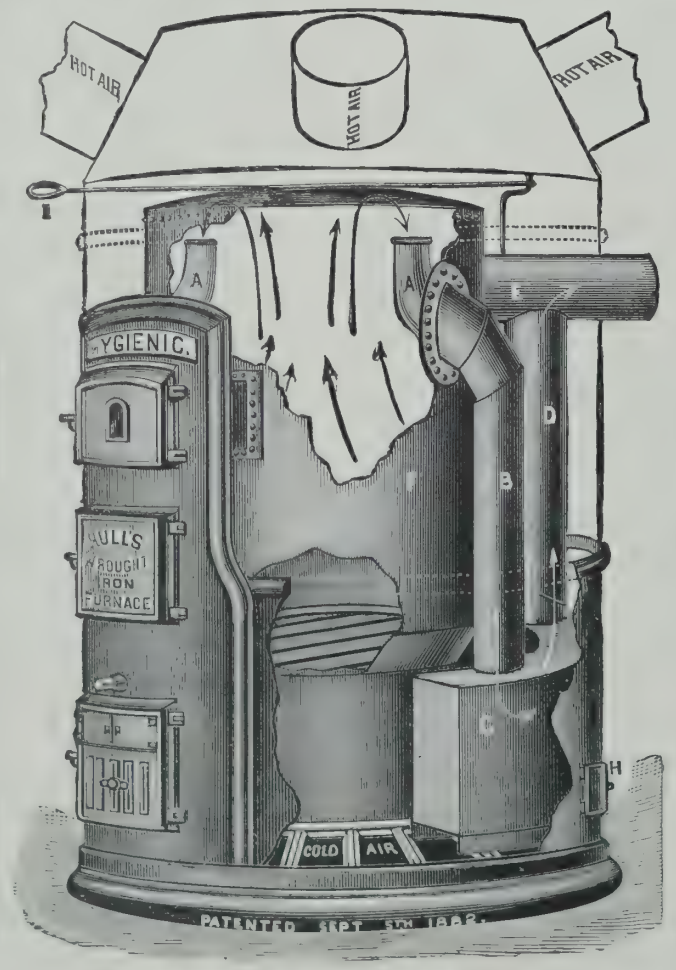
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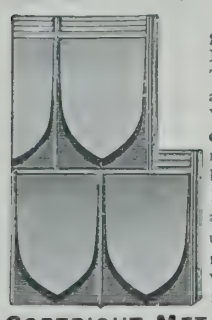
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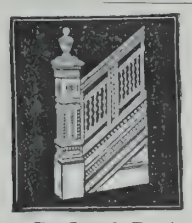


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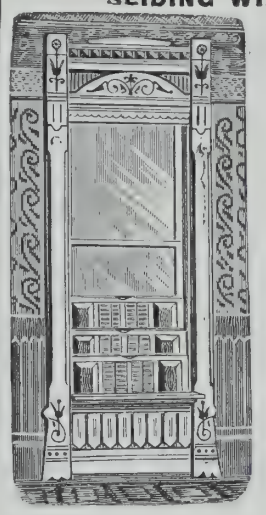
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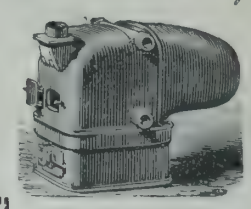


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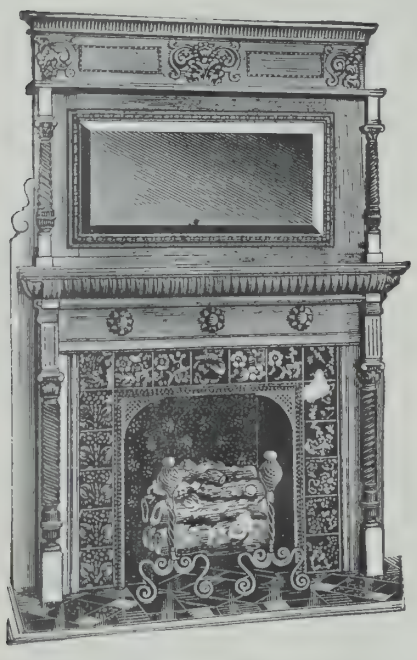


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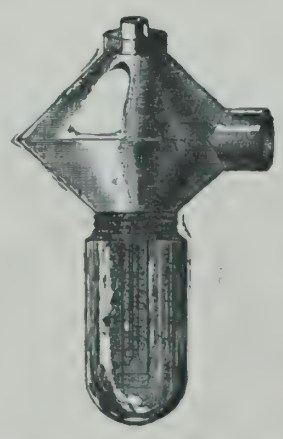
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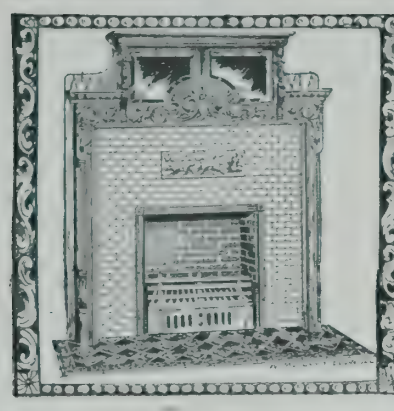
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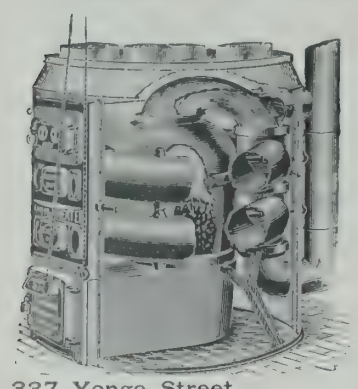
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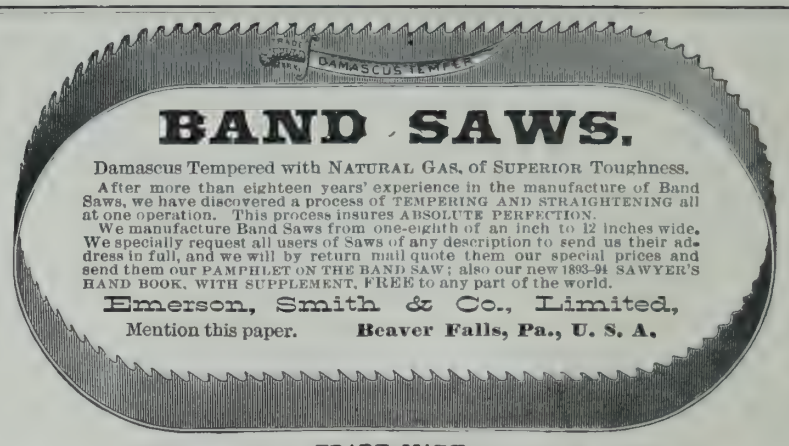
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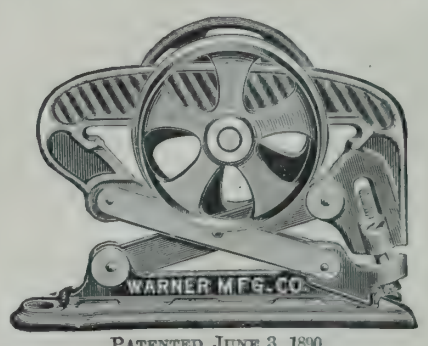
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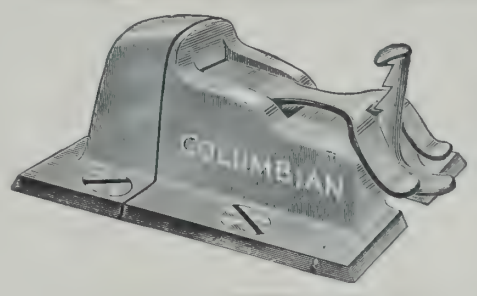
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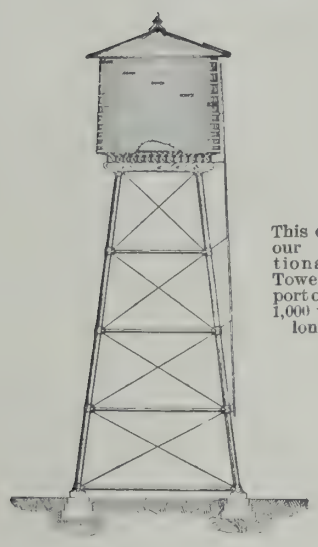

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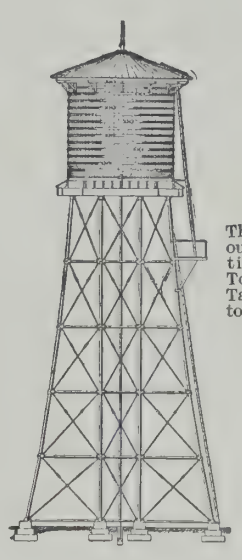


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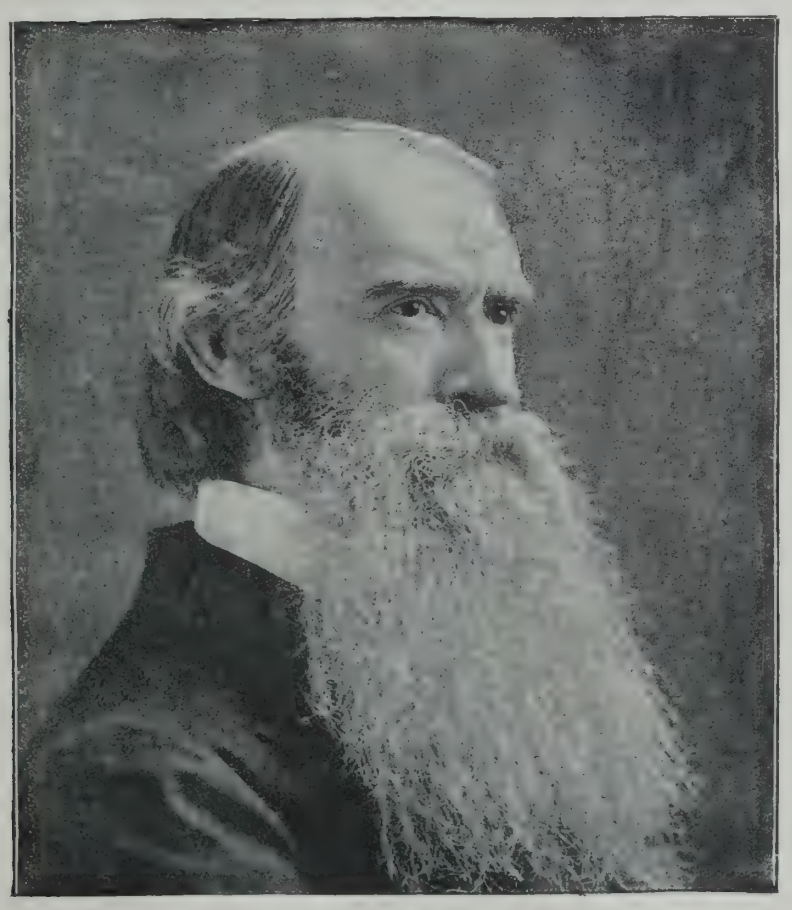

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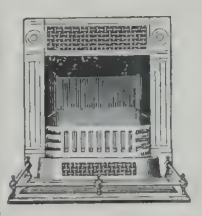


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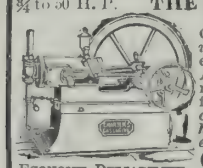
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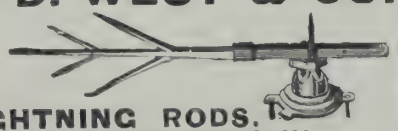
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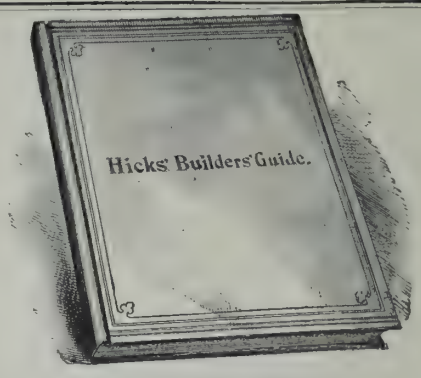
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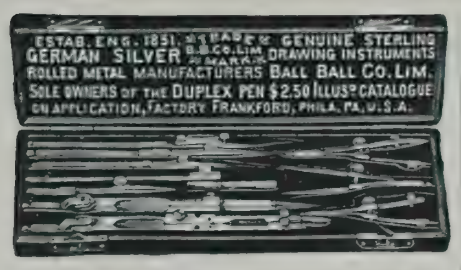
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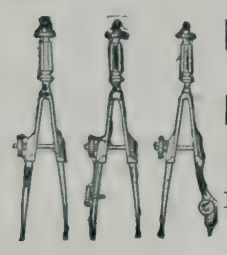
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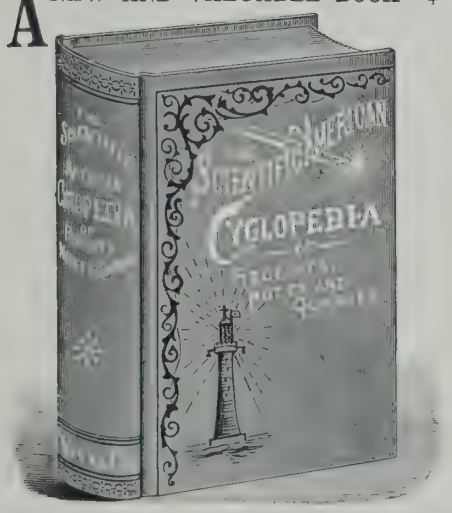


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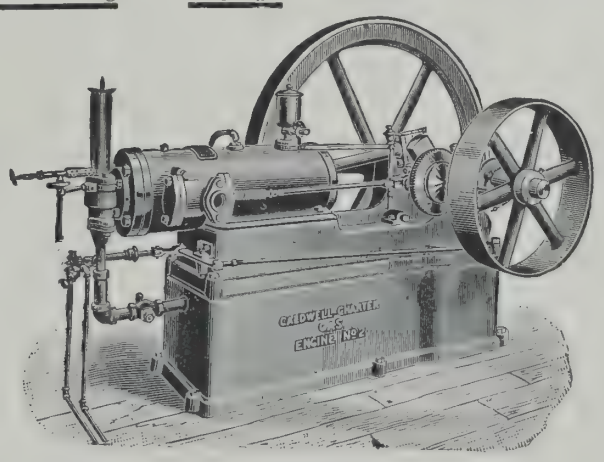
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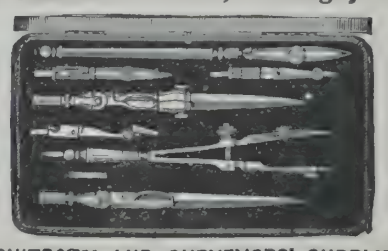
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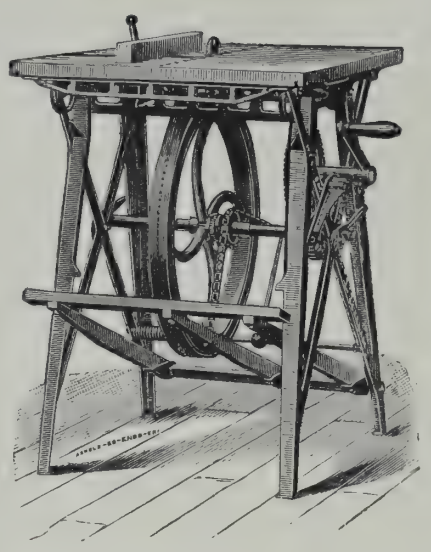


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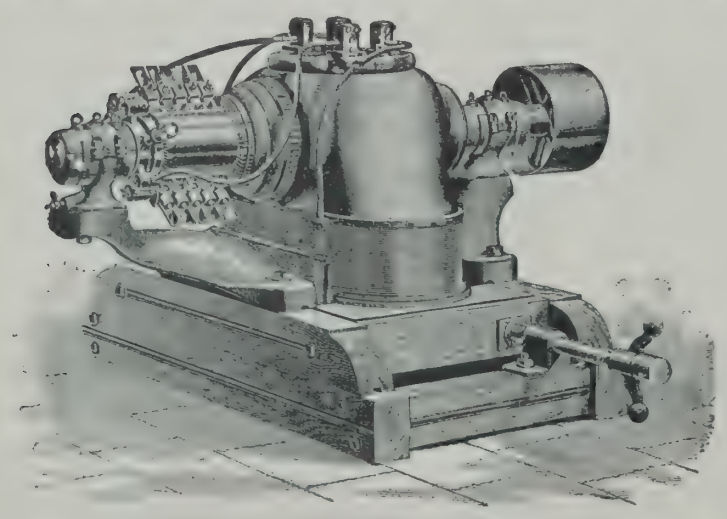
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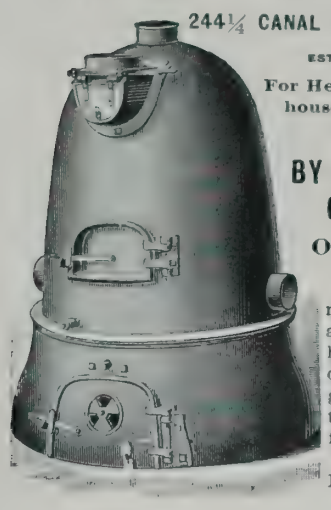
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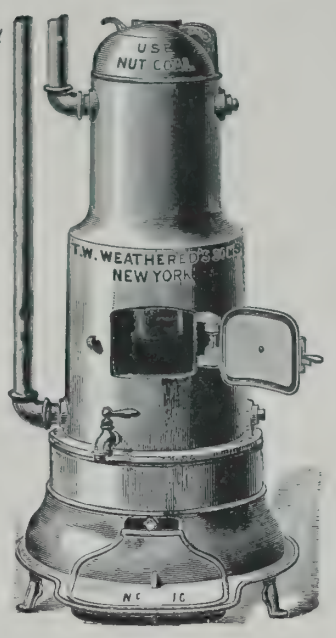
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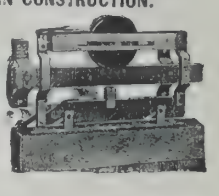
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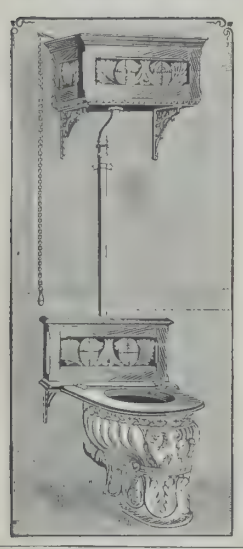
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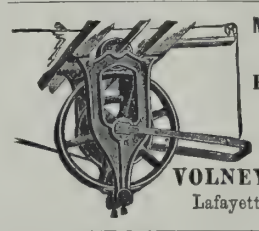
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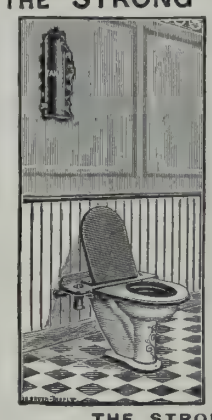
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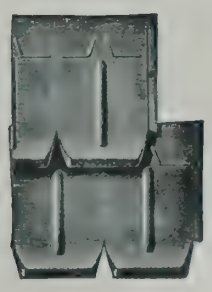
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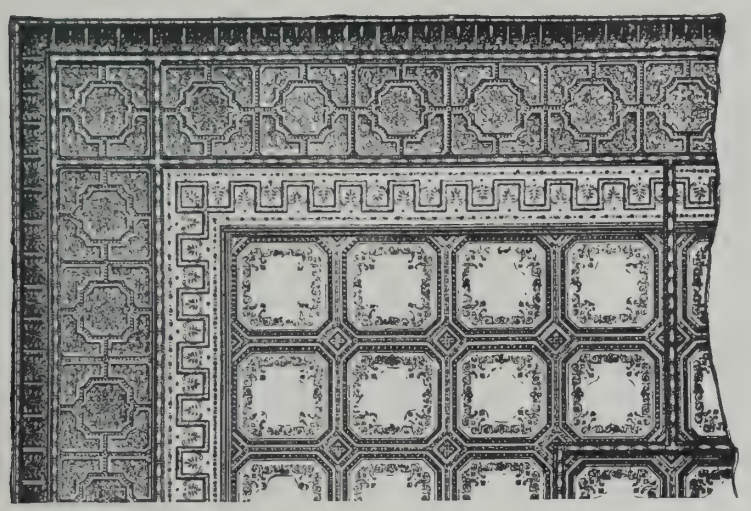


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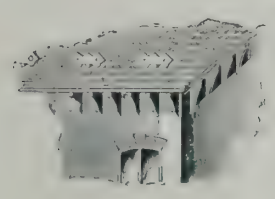
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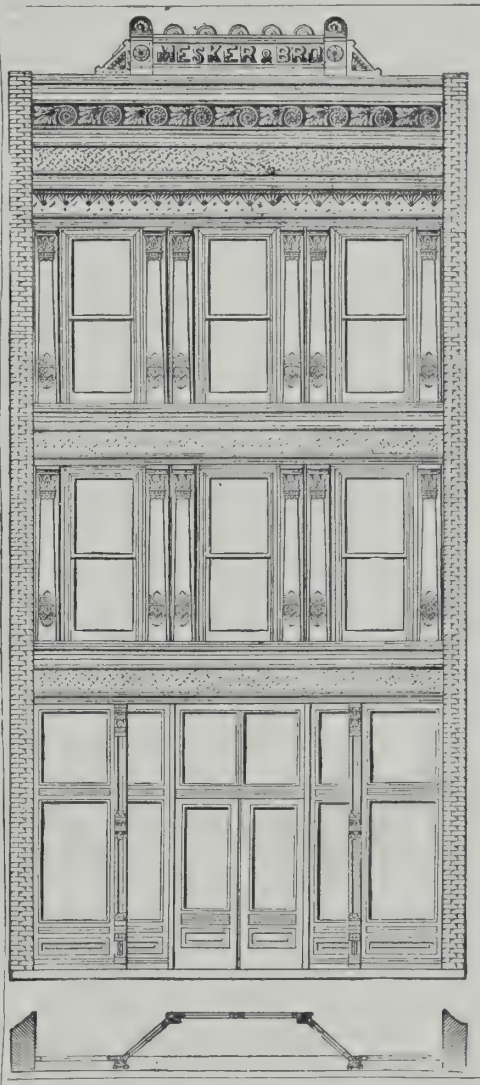
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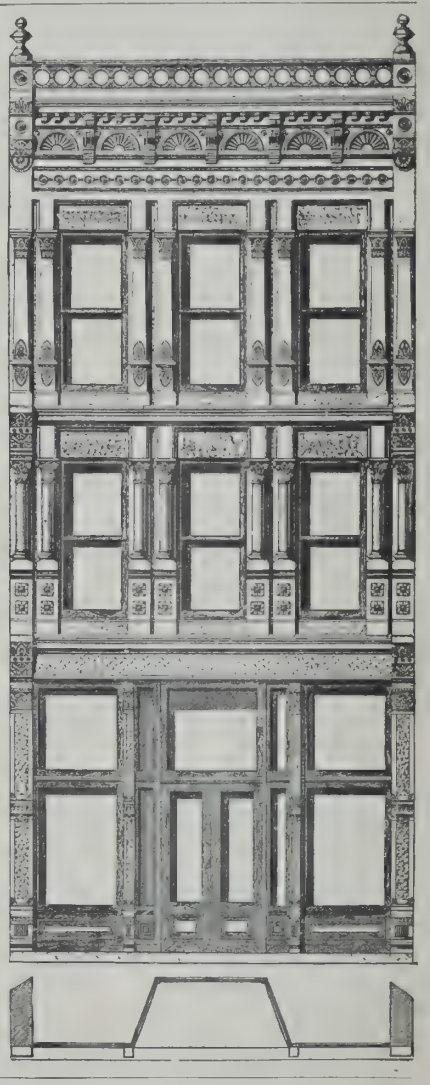
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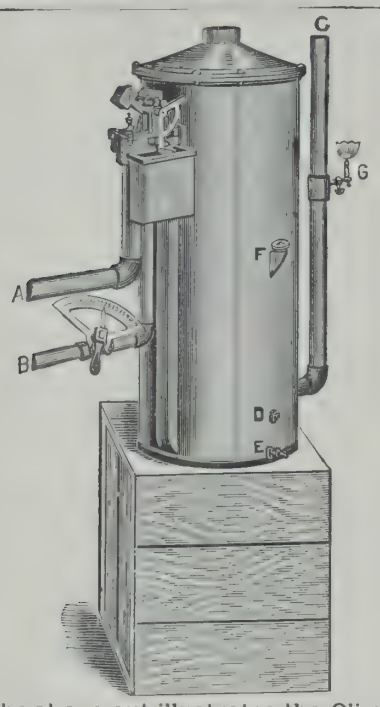
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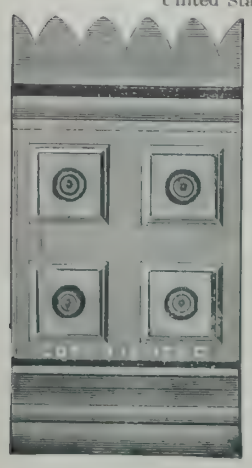
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(*Continued from page* vi.)

with expensive paper, badly stained this past summer with fly dirt, and would like to learn of some remedy to remove them. A. Bread crumb not too fresh will answer to clean wall papers. Grease spots may be removed in some cases by using ether.

(7) J. H. writes: With 5 pounds of pressure (steam), how many feet or inches, or what surface, does it require to heat 100 square feet of glass roof and sides of a greenhouse, in order to maintain a night heat of 55 to 65 degrees in the house while the thermometer outside ranges at 15 to 20 degrees below zero? Also the boiler surface necessary, etc.? A. 1 square foot of heating surface to 8 square feet of glass. Wrought iron pipe is the best for steam. Place along the sides of the house, both below and above the benches, 1¼ or 2-inch pipe, according to size of house. The boiler should have 1 square foot of heating surface to 6 square feet of radiating surface, and should have the water level in boiler not less than 4 feet below the floor of greenhouse. A horizontal tubular boiler is the best and most reliable. Steam heating for greenhouses requires that the fire should be stoked during the night as well as day. It is, therefore, not economical for small houses.

(8) P. H. W., Sandy Hill, writes: Please tell me whether it is safe to turn slops and waste from kitchen sinks into wells near residences. Our people have formerly used wells to supply our families with water, but we have water brought into the village of good quality, and many parties have discarded the use of their wells and have the village water brought into their houses, and turned the waste from their sinks into the wells. These wells are covered up. Will the natural currents through these wells carry off or purify these slops, or will the water in them be contaminated and send up through the waste pipe a bad stench, subjecting the family to diphtheria and other diseases not pleasant to contemplate? In my case the well is covered down some 8 feet below the surface. We find living water at 6 to 8 feet. Our wells are sunk to about 12 or 14 feet, soil is sandy and porous, water usually very good, but our hydrant water is cheap and of first quality, so we are making the change in general. Now, can I turn waste from my sink into the well with impunity? Object is to get rid of frost. The land is so level it is difficult to get rid of the waste. Water stands on the top of the ground in low places in wet seasons for weeks at a time. Usually when digging to set fence posts in early spring we find living water. A. The discharge of house waste or sewage into the wells of a town is a most dangerous expedient in the change of the method of water supply. What would be a convenience to one household might be poison to a neighbor, or a scourge of typhoid fever or diphtheria. The well water belongs to a subterranean circulating system, in which the water is in constant movement toward a lower level or toward the streams of a valley. The soluble matter of sewage is carried along with the subterranean current, crossing the wells of neighbors and contaminating their water. This effect would be strongly developed in the sandy subsoil of your town, and has been proved by analysis to infect large districts on the drainage side of towns. The increased use of water induced by a water works largely increases the sewage, and a town soil where no provision is made for sewers soon becomes saturated with sewage and its malarial miasma. This is no fancy idea, but a stern reality in many towns and cities that, after epidemics have afflicted them, have reluctantly adopted a sewerage system. We advise you to keep your sewage in shallow cesspools until all have discarded the use of wells, then if necessary use the wells until a sewerage can be made.



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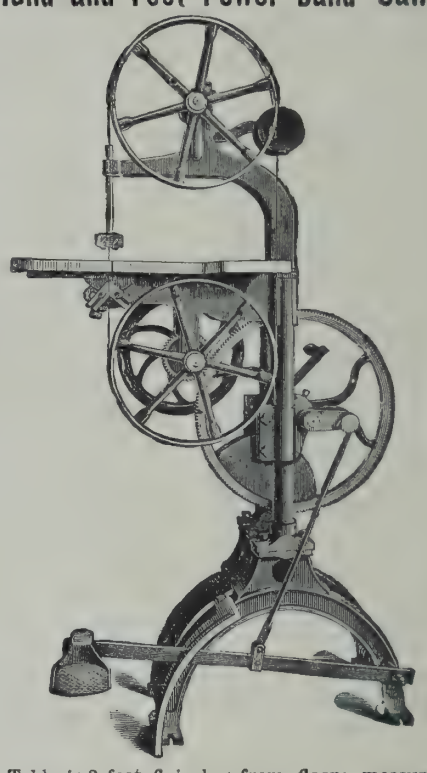
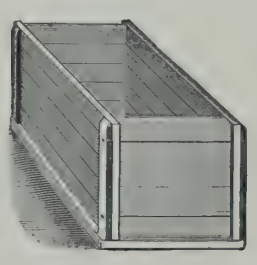


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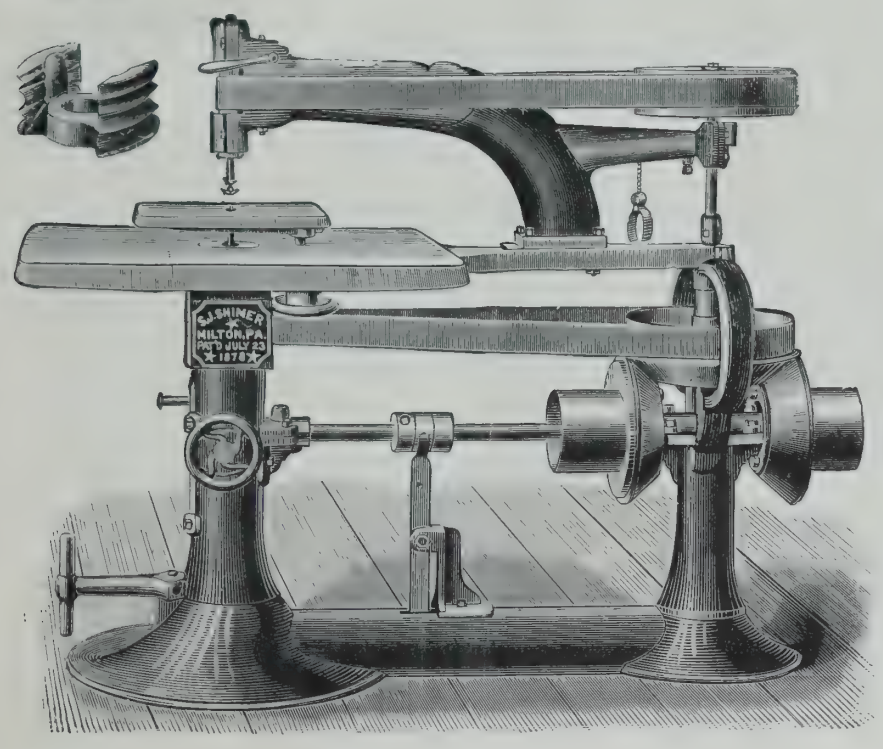
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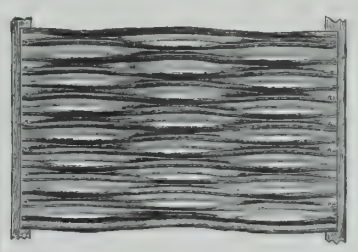
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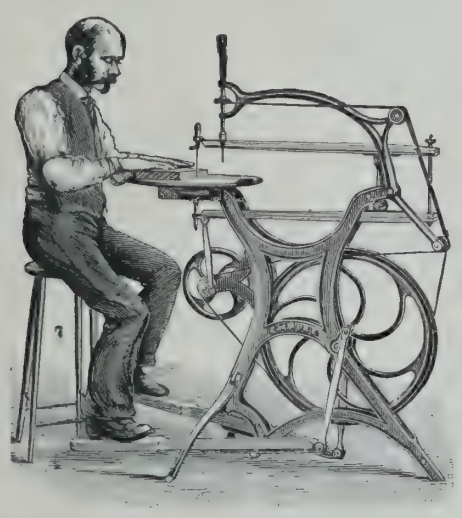
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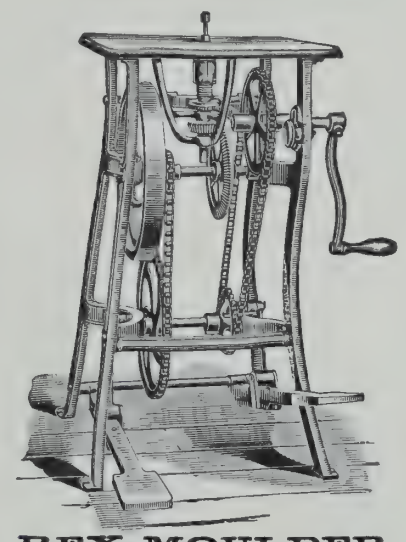
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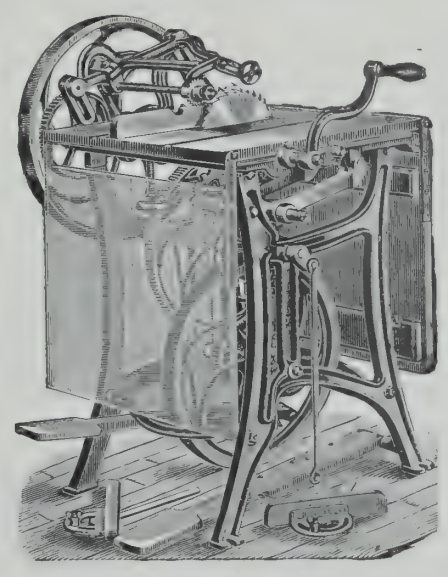
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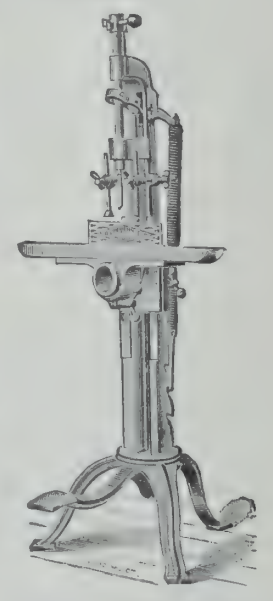


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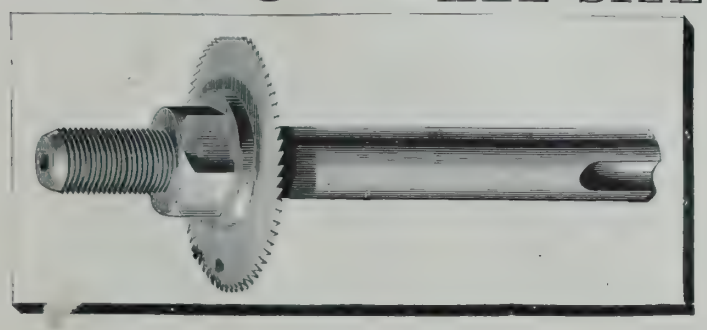
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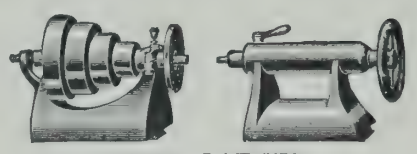
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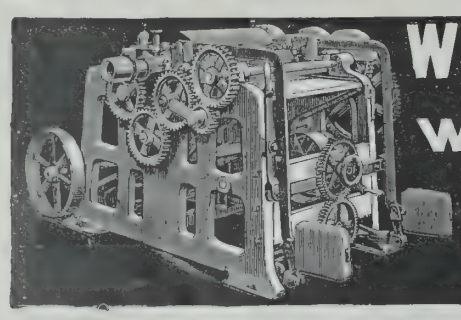
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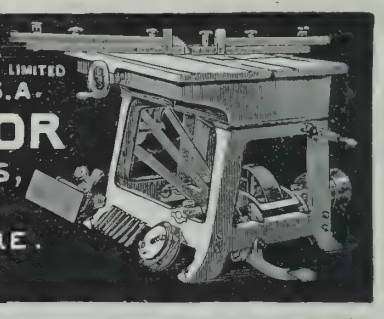
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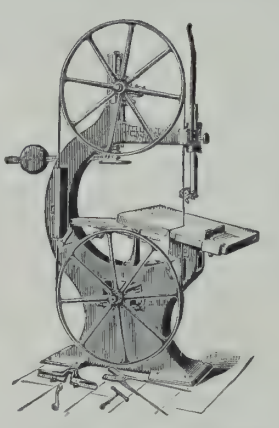
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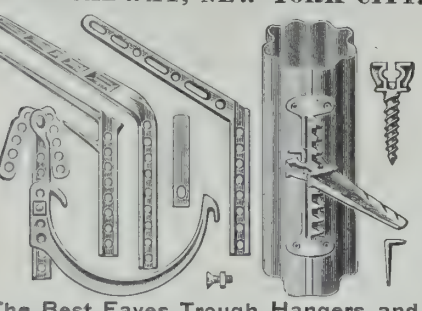
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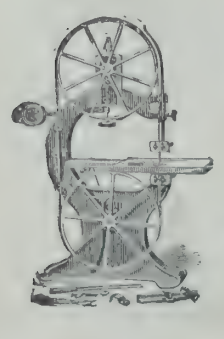
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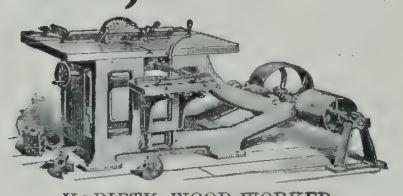
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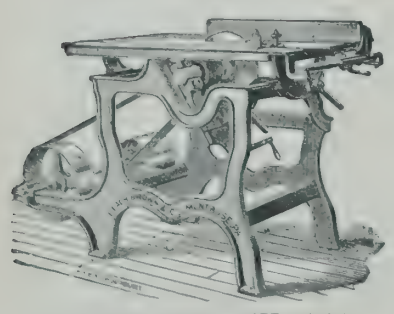
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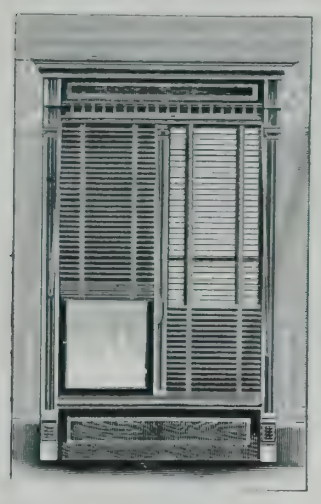
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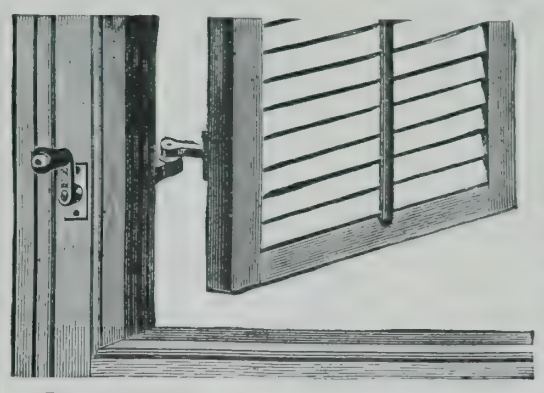
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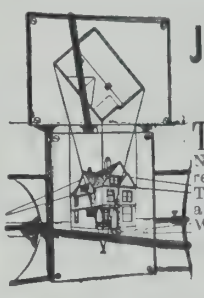
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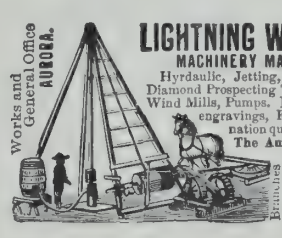
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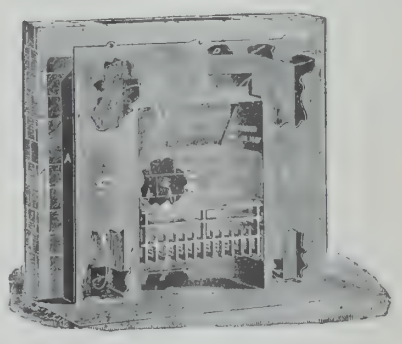


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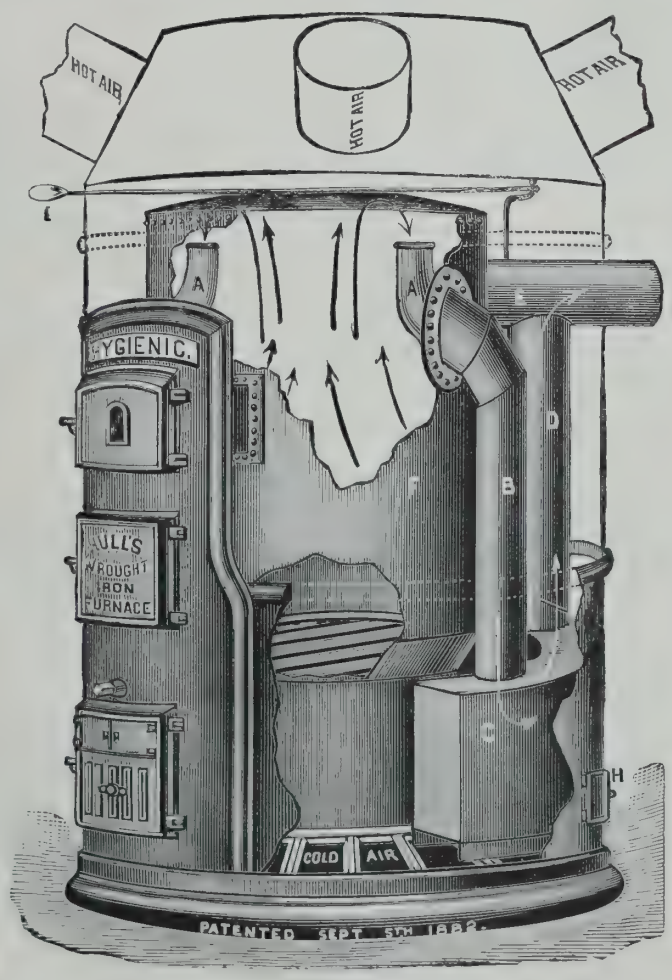
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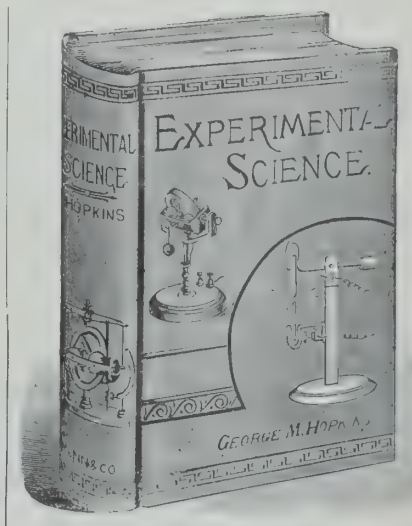
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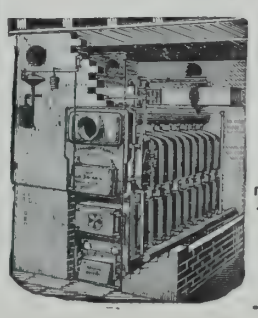
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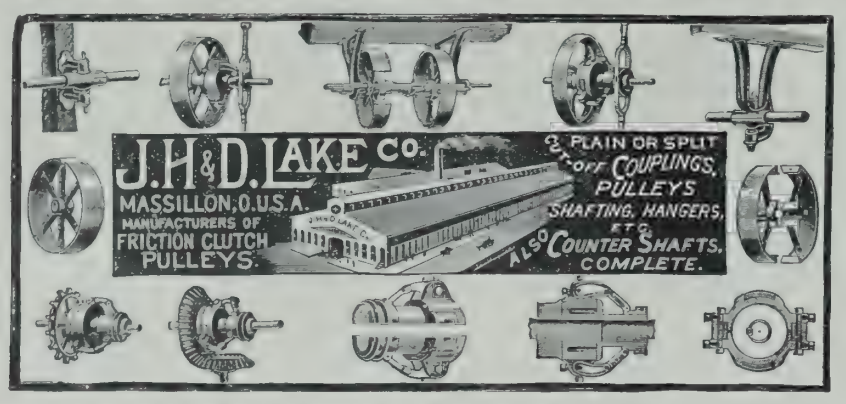
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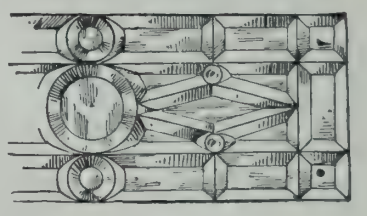
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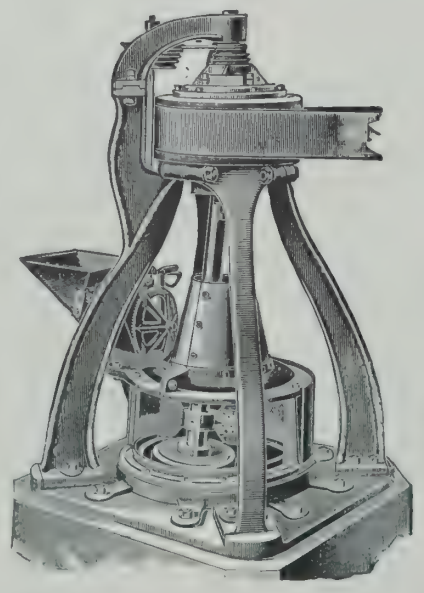
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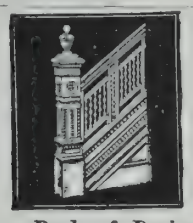
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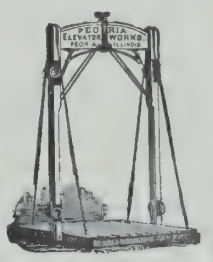
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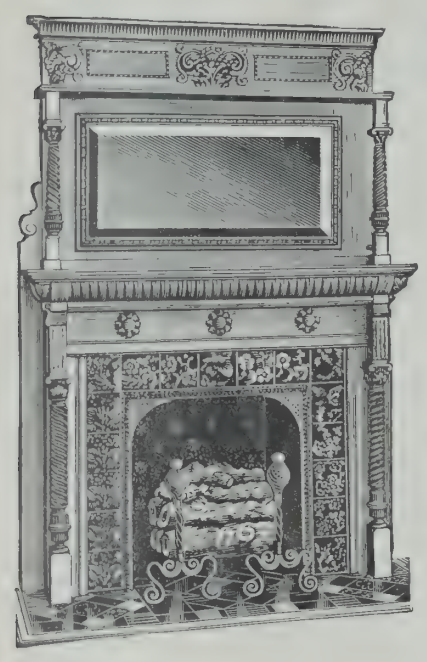
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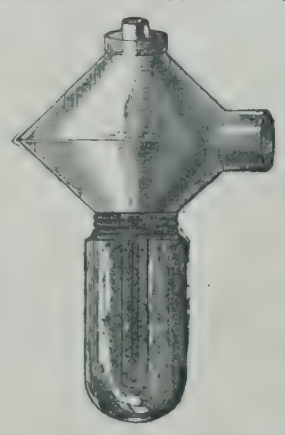
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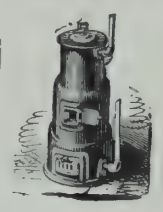
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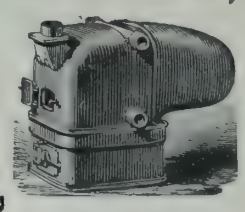


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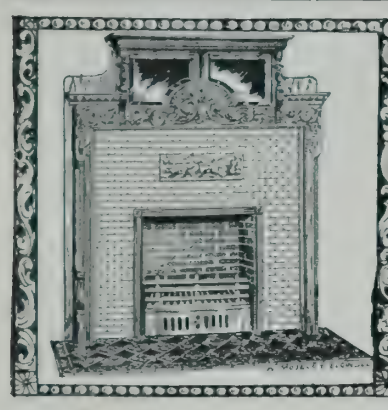
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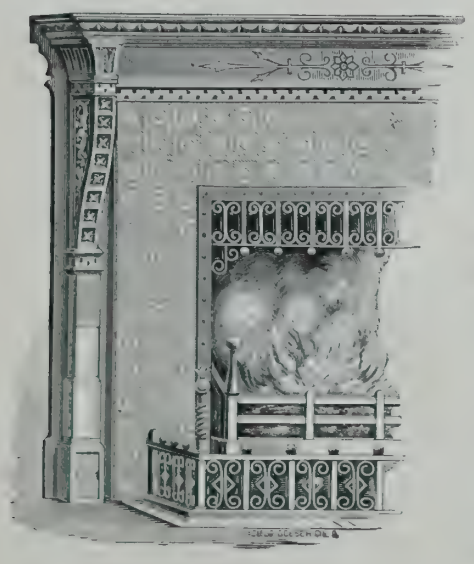
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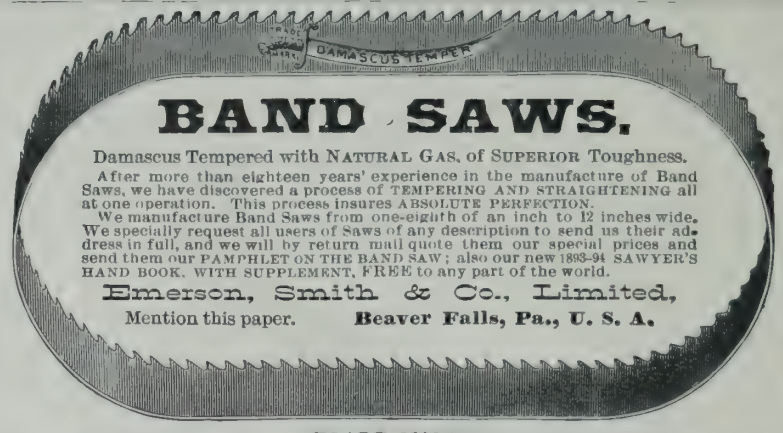
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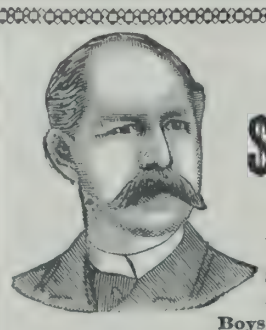
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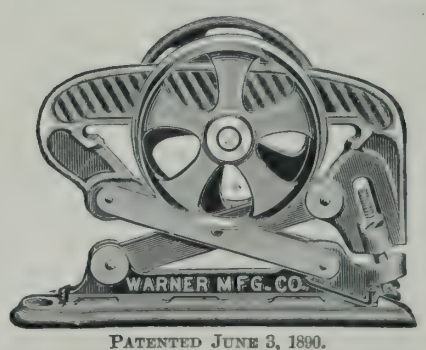
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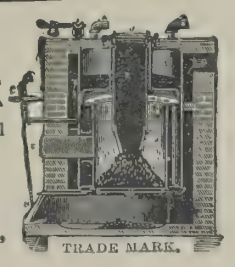
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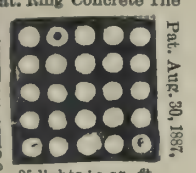
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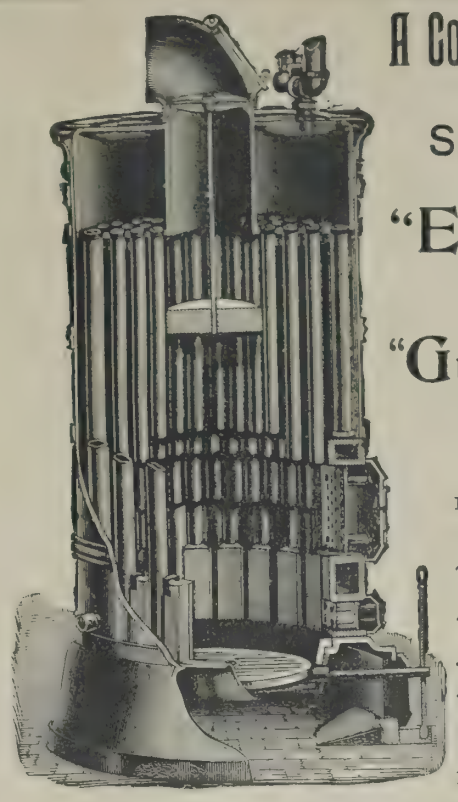
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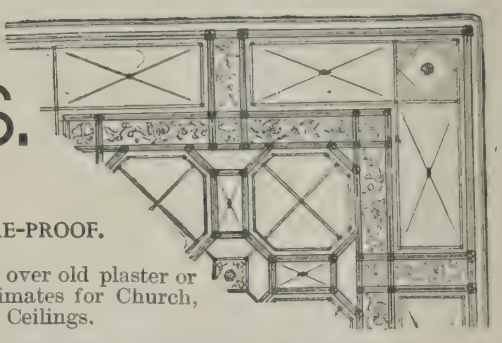
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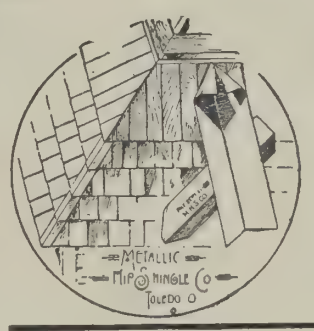
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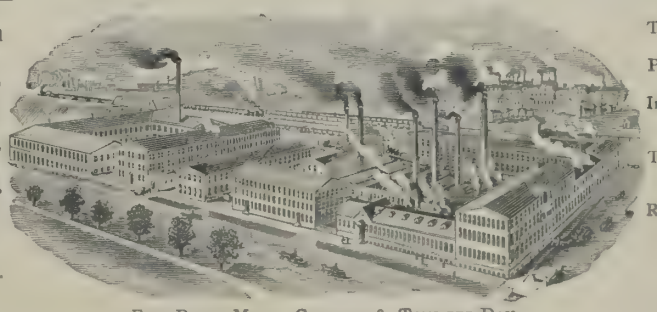
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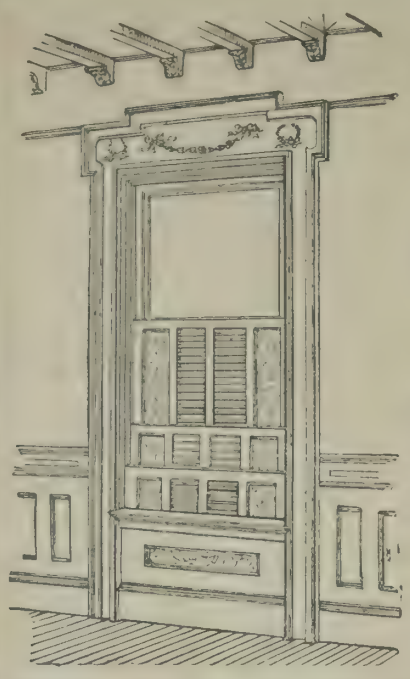
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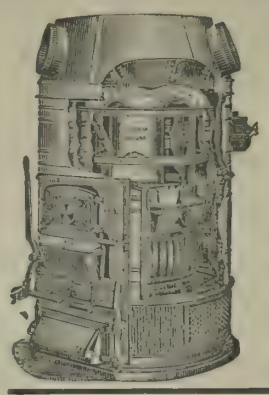
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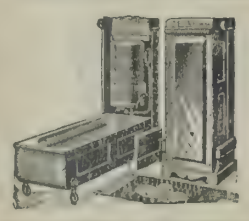
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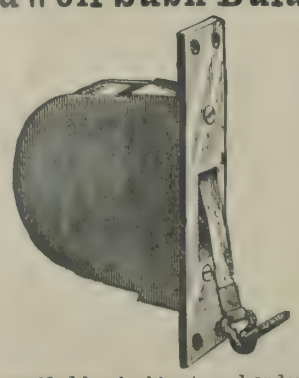
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